THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIII, No. 575.] LONDON, MAY 19, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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SETTING RETORTS,
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DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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STEEL TOOLS FOR GAS & WATER WORKS.

All-Steel Charging and Stoking Shovels, Coke Screens and Forks, Steel Scoops, Picks, Mattocks, Axes, Trowels, &c.

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SUPERIOR CAST-STEEL FILES and SAWS; Solid Cast-Steel Hand and Sledge Hammers.
BEST CAST STEEL for making Chisels, Turning Tools, Taps and Dies, Drills, Snaps, &c.
SINGLE AND DOUBLE SHEAR, Spring, Sheet, and Blister Steel.
SILVER STEEL for Rod-Chisels and Diamond-Points for Cutting Cast-Iron Pipes, and for other work requiring a Special Quality and Temper, and every other description of Steel and Tools as supplied to the largest London Gas Companies, Contractors, and Engineers.

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SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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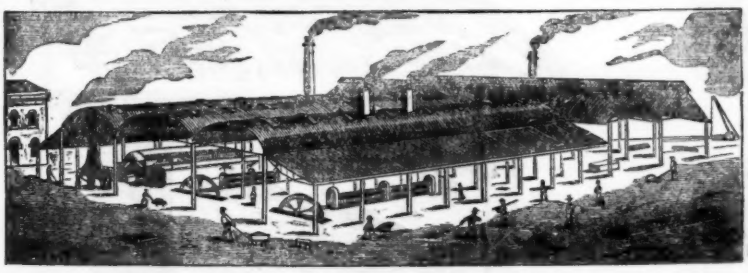

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Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

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Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction. (A guarantee of five years given with every Meter.)

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PORTABLE GAS STOVES

FOR

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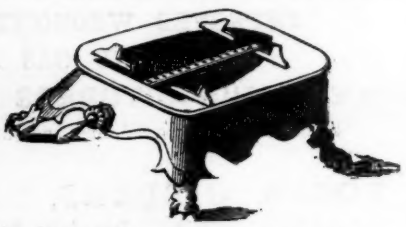
K 23, £18.

THE "GEM" BREAKFAST GRILLER.

No. 215.—12 in. × 10 in., and 16 in. high, 45s.

LAUNDRY HEATING STOVE.



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STOVE FOR SOLDERING IRONS,

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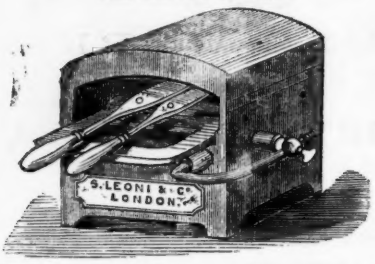

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ECONOMICAL KITCHENERS,

HEATED BY ATMOSPHERIC GAS,

FREE FROM SMELL AND OTHER INCONVENIENCES.

FOR

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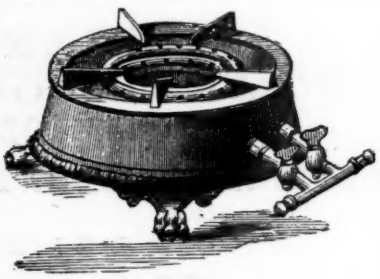

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8 in. diameter × 4 in. high, 12s.

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K 5.—14 in. × 14 in. and 2 ft. 9 in. high, up to 12 lbs., £7 10s.
K 6.—18 „ × 18 „ 2 „ 11 „ „ 24 „ 10 0
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SCALE 1 1/2 to a foot

G 13, £4 10s.

16 in. wide × 15½ in. deep, and 20½ in. high;
Hotplate, 22 × 19½ in., fitted with three Boiling Rings.

All Gas Burners, inside as well as outside, on the atmospheric principle; preventing soot and bad combustion.

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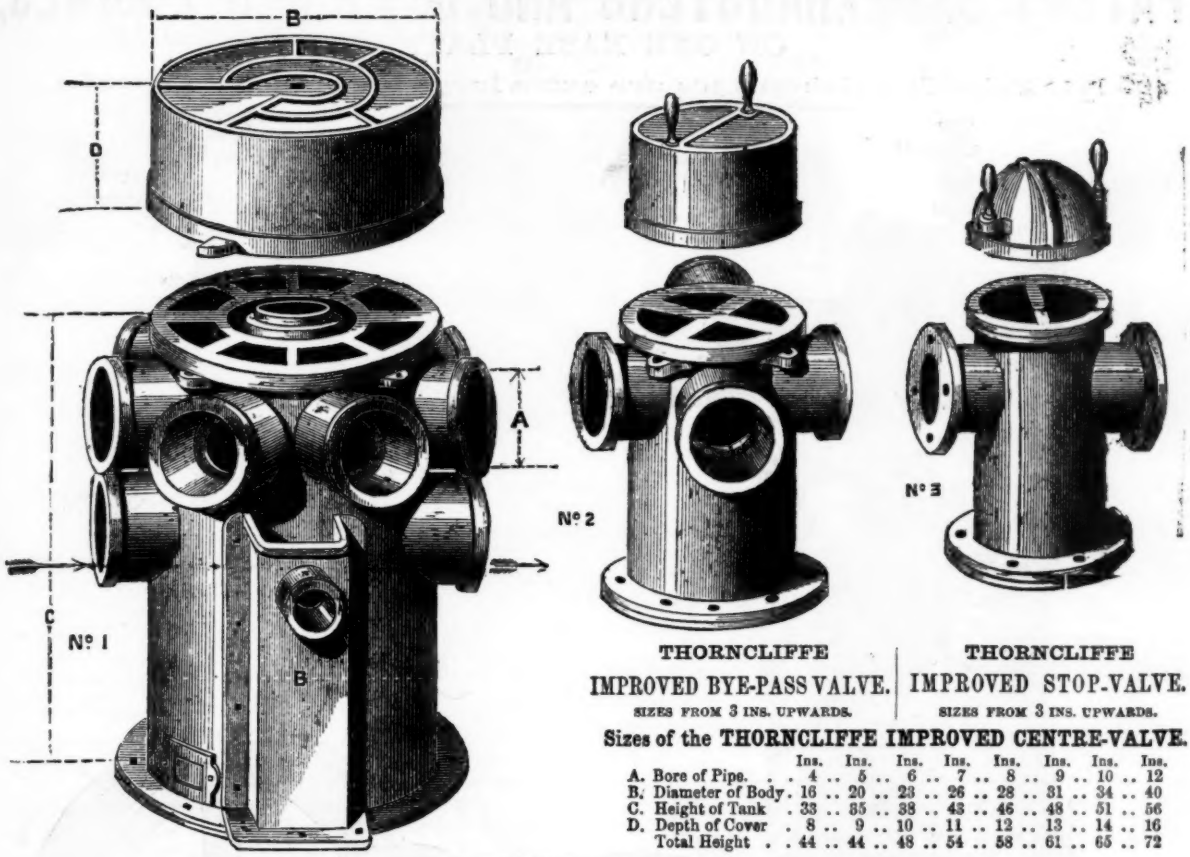
THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

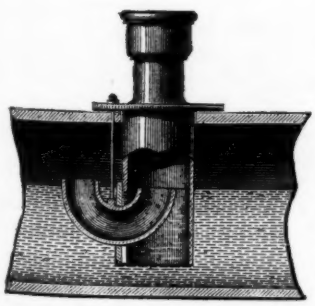
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

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GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

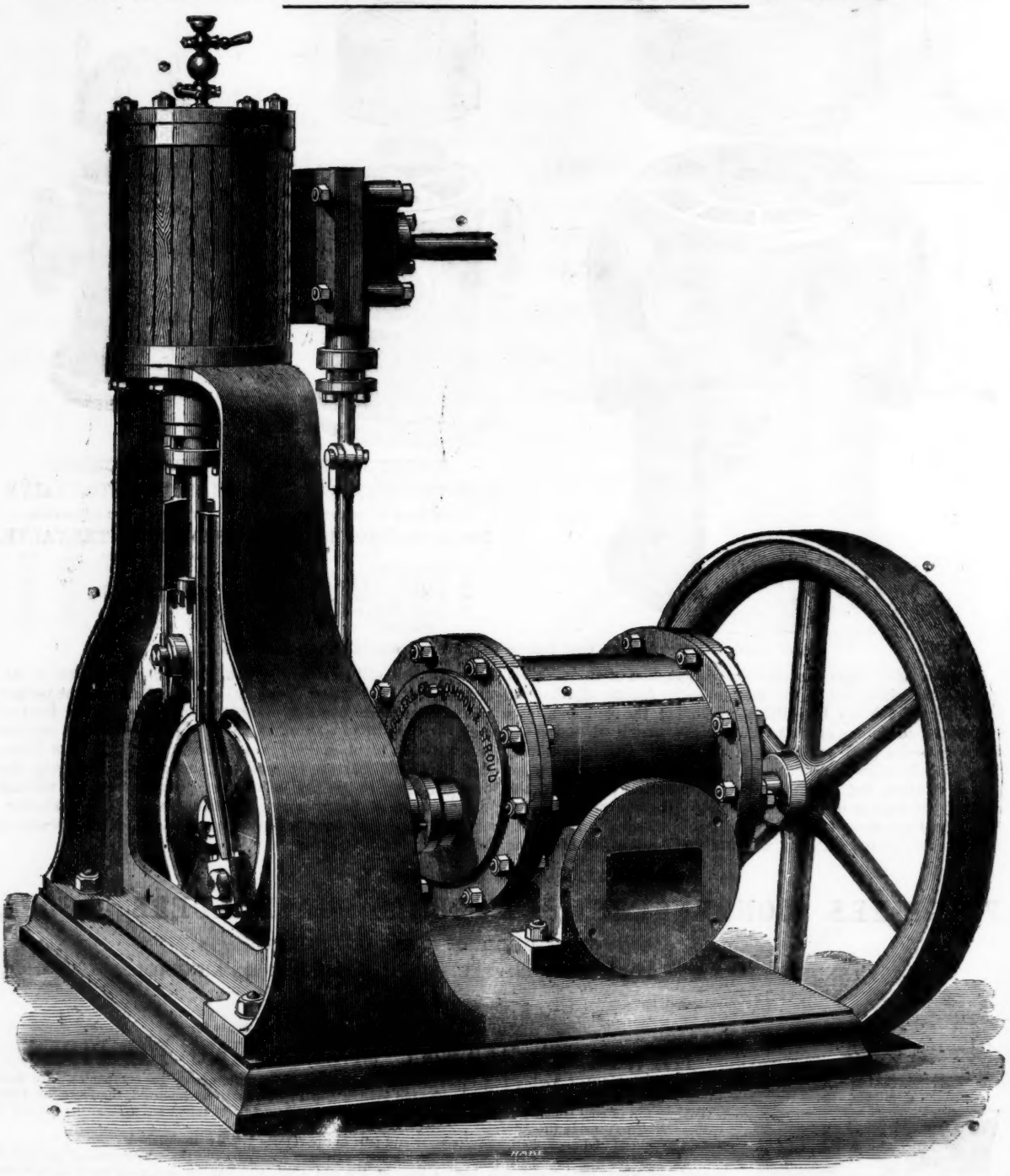
SOLE MAKERS OF

Beale's Improved

PATENT GAS-EXHAUSTERS AND COMBINED ENGINES,

ON ONE BASE PLATE.

NOTE.—The Exhausters are extra large for moderate speed.



This COMBINED VERTICAL ENGINE and EXHAUSTER was specially designed by G. WALLER AND Co. for small works, where space is an object, and is applicable for Exhausters from 1000 to 15,000 per hour. This is the *only* Engine and Exhauster **complete on one Base Plate,** requiring only one foundation.

NOTE.—They are sent away complete, and are easily fixed.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

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STROUD, GLOUCESTERSHIRE.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

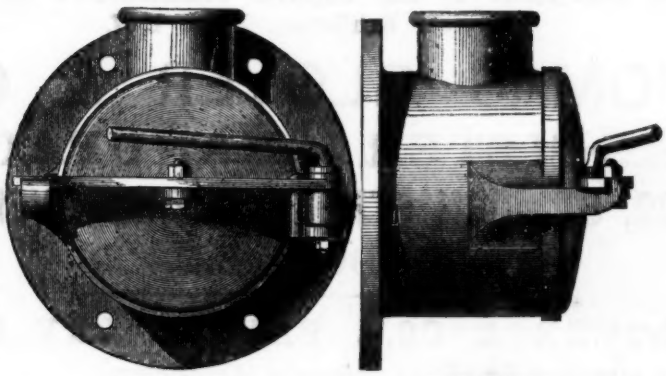
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 10,000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



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SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydfl. Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14. 1871.*

"Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) "F. J. EVANS."

GREAT REDUCTION IN PRICES

OF

THE "SPECIAL"

DIRECT-ACTING STEAM PUMPS.

Nearly 4000 have been sold since their introduction in 1867.

IN USE IN OVER EIGHTY GAS-WORKS IN THE UNITED KINGDOM,

FOR PUMPING AMMONIACAL LIQUOR, WATER, OR TAR.

VIENNA EXHIBITION, 1873.

THE HIGHEST PRIZE AND

ONLY "MEDAL FOR PROGRESS,"

FOR

DIRECT-ACTING

STEAM PUMPS

FOR GENERAL PURPOSES,

WAS AWARDED TO

TANGYE BROS. & HOLMAN,

LONDON,

For the "Special" Steam Pump.

PRICES AND SIZES OF "SPECIAL" STEAM PUMPS USUALLY ADOPTED IN GAS-WORKS AND CHEMICAL WORKS.

Diam. of Steam Cylinder .. In.	3	4	4	6	4	6	6	7	6	8	7	10	8	10	12
Diam. of Water Cylinder... „	1½	2	3	3	4	4	5	5	6	6	7	7	8	8	9
Length of Stroke ..... „	9	9	12	12	12	12	12	12	12	12	12	12	18	18	24
Diam. of Suction & Delivery „	1	1¼	2	2	3	3	3½	3½	4	4	5	5	6	6	7
Gallons per Hour, approximate.	680	815	1830	1830	3250	3250	5070	5070	7330	7330	9750	9750	13,000	13,000	16,500
REDUCED PRICES . .	£16	£18	£20	£25	£25	£30	£35	£40	£40	£50	£50	£65	£65	£75	£110

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 19, 1874.

Circular to Gas Companies.

THE days for advances in the price of gas are not yet passed. In our last we had to chronicle a rise made by the Corporation of Rochdale to the extent of 9d. per 1000 feet. To-day we have to notice a similar advance resolved upon by the Corporation of Salford. It is quite clear that if these Corporations are to go on making large profits out of their undertakings, such increases in the price of gas are inevitable. They supply rich gas, requiring mostly cannel coal for its production, and we have repeatedly expressed an opinion that no, or at most a very slight, fall is to be expected in the cost of cannel. For this reason we may anticipate that the Corporations in the North, who will persist in making large surplus profits, must go on raising the price of gas. The time will probably soon come when consumers will look into the matter, and, in the end, we have no doubt they will arrive at the conclusion, that there is no necessity for, and propriety in, those large profits. At Rochdale some advance is clearly unavoidable, and in Salford it seems that it will be impossible to go on supplying gas at present prices without trenching on capital, or resorting to the borough fund to cover the loss. Our readers will see that the "divisible" profit made by the Corporation of Salford last year is not quite equal to half the estimated increase in the cost of coal and cannel for this year; some increase was, therefore, inevitable. There are those in the council who think the advance excessive, and they are probably right from one point of view, but without a fuller knowledge of the circumstances we cannot express a confident opinion.

The scare occasioned by the threatened strike of the Durham colliers has passed away; but not the consequences. With the prospect that the threat will be carried into execution when the next reduction of wages is proposed—and another is certain to be proposed shortly—it is not at all likely that coalowners will enter into contracts at prices much below those ruling at present. The gas coal trade is still in a very unsettled state, and no hope can be entertained of any considerable reduction in the contract prices for the present year.

We need say little to commend the attention of our readers to the paper on the "Depreciation of the Values of Coal and Coke "produced through Stocking," by Mr. Graham, which we publish to-day. The writer, perhaps, exaggerates the loss of producing and illuminating power occasioned by stocking, except in the case of the most friable coals; but, on other points, he is, no doubt, correct. The worst of it is that "stocking" cannot be entirely avoided; but Mr. Graham shows the best reasons for keeping the amount of coal stocked at a minimum.

An agitation on gas matters has commenced at Worcester. It is hardly disguised that the ultimate aim is the acquisition of the undertaking of the company by the Corporation; but, as usual, the object is kept in the background, while accusations of charging an extravagant price, and other wrong-doings, are brought against the company. As regards price, we do not think the Town Council have anything to complain of, and they must admit that the directors of the gas company are best able to judge when an advance is necessary. The council, it seems, have made an examination of the accounts filed with the Clerk of the Peace, under the provisions of the Gas-Works Clauses Act, 1847, and they have come to the conclusion that the cost of gas in the year ending the 30th of June, 1873, after deducting the amount realized from the residual products, was but 1½d. per 1000 feet more than in the previous year, and does not justify the increase in the price charged for supplying the public lamps, or the withdrawal of the discounts allowed to private consumers of gas; that the accounts of the gas company show that large sums have from time to time been applied out of the surplus profits of the company to the purchase of houses and land, and alterations in and additions to the works and mains, instead of being applied to the reserve-fund, and that the reserve-fund has not yet been made up to £5000, as it might and should long since have been. The accounts, however, did not show what the directors only know too well—viz., that a very favourable contract for coal expired in July last year, and that this year the cost of the raw material is just about 50 per cent. more than it was last. As to the remaining charges, we have no doubt an equally good explanation is ready. In these days we believe it is bad policy to charge revenue with what may properly be brought into capital account; but we have only a vague statement that houses and land have been purchased with the surplus profits, while the reserve-fund has been neglected. There promises to be something like a paper war between the company and the Town Council, each one circulating a statement of accounts; and the latter body defer for the present taking action against the company.

Strange reports from consumers of extraordinary and, to them and also to ourselves, unaccountable fluctuations in their consumption of gas are continually reaching us, but we rarely notice them. When, however, they come from a body like the Newcastle and Gateshead Chamber of Commerce, they may deserve some attention. At a meeting of the chamber, held last week, a member called attention to the gas supply, and complaints were made by several gentlemen that their gas bills in the past quarter were 30 per cent. higher than in the corresponding quarter of last year. The suggestion, of course, was an increased consumption in consequence of the poorness of the gas, some alleging that the company forced air through the pipes along with the gas. Preposterous as such a statement is, it seemed to receive credence. We only allude to the matter in order to remark that it might be worth while making an inquiry into one or two cases. In most cases of such complaints, facts are very much distorted and exaggerated. "Poor" gas generally means burners out of order, the mischief caused by which is only aggravated by an increased consumption of gas.

The West of Scotland Association have started a "Gas "Managers Benevolent Fund," to which, seeing that their

object is to afford assistance to necessitous managers or their families in any country, they invite contributions from all countries. We hope their invitation will be liberally responded to.

Mr. Arthur Silverthorne, C.E., has published a small pamphlet entitled, "Metropolis Gas Supply: On the Chartered Gas Revision, "1874," in which the award and memorandum of the revising commissioners is subjected to some mild criticism. As a pupil of the late Mr. Samuel Hughes, the author is naturally a gas reformer; but we are bound to add that, like his master, he is not one of the confiscating, revolutionary class. He has, of course, a very bad opinion of the metropolitan gas companies, and seems to think that no amendment will ever take place without the stimulus of "further legislation." But we are left in the dark as to what the further legislation should be.

The bulk of Mr. Silverthorne's publication consists of a reprint *in extenso* of the awards and memoranda of the commissioners, on the application of both Imperial and Chartered Companies. With reference to the former he has but little to say; the latter, as we have said, is submitted to some criticism. At the outset, the author complains that the commissioners did not include among their number a practical gas engineer. We said last year that the composition of the commission might have been improved by such a member, and while accepting, without the smallest reserve, the decision of the present Board as eminently satisfactory, we may express a hope that in another commission a gas engineer may be found. The terms of the Acts under which the commissioners are appointed are, however, so precise and peremptory, that, had all of them been gas engineers, the same decision must have been arrived at. Certain details of working expenses might possibly have been more closely looked into; but we do not believe that this would have affected the result.

Mr. Silverthorne considers that it was abundantly proved before the commissioners that the Chartered Company could supply gas at a fraction over 4s. 4d. per 1000; but nothing in his pamphlet substantiates the statement. The cost of gas per 1000 feet, he says, is made up of three distinct elements:—

1. Net cost of raw material.
2. Cost of working expenses.
3. Amount to pay interest and dividend on the capital.

The most important item of the three, he adds, is *not* the net cost of the raw material, but the cost of the working expenses, and it is only by a systematic reduction of these, supplemented by an increased annual supply, that gas is enabled to be supplied cheaply. The author asserts that an increased price in coal is always compensated for by a corresponding rise in the value of residuals. But his own figures (pp. 37, 38) show that the increased value of residuals may not be proportionate to the advanced price of coal. He further expresses a firm belief that the companies who have applied for a revision of price would have been equally compelled to do so if there had been little or no disturbance in the coal market. It is difficult to see why, and Mr. Silverthorne states no grounds for his belief. Apart from the increased price of coal, and a corresponding advance in the cost of iron, there is only the matter of labour, the value of which is continually rising. Would the author have put a restriction on this cost? He attributes high charges "to the present unre-"stricted cost of manufacture;" but how is this cost to be restricted. It is said rightly enough that a larger production and sale of gas per ton of coal will attenuate expenses; and we may take it that it is only in this way that it is proposed to reduce the cost of manufacture. There is here, however, as said at page 35, only "the nucleus of a saving." Mr. Silverthorne, in the interest of the gas consumer, of course, objects to the pensions and allowances which influence working expenses, and in the accounts of the Chartered Company have reached a rather formidable figure. They are, however, justified by statute and by public morality, and although pensioners are proverbially long lived, time will gradually bring down the sum, which this year, we rather think, reaches its maximum. We quote at length the last paragraph but one in the pamphlet. "It is evident," says Mr. Silverthorne, "that the necessity for the present increase [in "the price of the Chartered Company's gas] must be sought for "only in the enormous and extravagant nature of the present "working expenses, which require some official kind of supervision "beyond that of mere audit. The prospect of gas coal falling "below 20s. 6d. can be depended upon with no degree of certainty, "but that residuals will suffer further depreciation is likely, and, "consequently, I cannot see how any material improvement can "be expected further than that which has already taken place, and "which would have justified the commissioners in fixing a much "lower price." Surely the latter sentence offers a complete answer to the former. If no material improvement is to be expected beyond that spontaneously made, and being continued by the company, why should they be subjected to "official super-"vision," which everybody knows always increases the price of gas? In conclusion, while admitting that Mr. Silverthorne, on the whole, writes very fairly, we may express a wish that he had written more fully or not at all.

Mr. Tadman, the manager of the Norwich Gas Company, has brought out an enlarged card of directions for taking the register of meters, which is very explicit in the instructions. Many consumers are greatly mystified by the dials on a meter, and the circulation of a card like this, which would show them how to read their meters, might possibly make them more satisfied with their gas bills.

The annual meeting of the British Association of Gas Managers is to be held this year in London, in the rooms of the Society of Arts, on the 9th, 10th, and 11th of next month. The following is a list of papers and communications to be read at the meeting:—On "Vincent's Patent Gratings applied to Gas-Retorts," by Mr. Hodgson Jones; on "Purification," by Mr. George Anderson; on "Condensation and its Effects in the Retention of "Naphthaline," by Mr. James Watson; on the "Desirability of "Companies Extending their Control to the Point of Consump-"tion," by Mr. Isaac A. Crookenden; on "Meters," by Mr. W. J. Warner; on an "Improved Method and Apparatus for "Manufacturing Gas," by Mr. John West; on the "Retention "of Naphthaline," by Mr. G. D. Malam; on "Gasholders," by Mr. C. Woodall; and on "Unique Effects from Simple Means; or, "a Description of the Latest Results obtained by Mr. A. Malam "from his New Process for Manufacturing Cannel Gas," by Mr. G. D. Malam. All these papers, it will be seen, are of a practical character, and we have no doubt much valuable information will be communicated. The evening lecture will be delivered by R. Etheridge, Esq., his subject being the "Geology of Coal," and a very interesting lecture may be expected. The usual dinner will take place, and the meeting will be terminated by an excursion to the Royal Arsenal, Woolwich. We need hardly express a hope that the meeting will be well attended.

WATER AND SANITARY NOTES.

The Mid-Lothian Water Bill and the Musselburgh and Dalkeith Water Bill have been withdrawn, so we may infer that the opposition to the Edinburgh and District Water Bill—the Moorfoot Bill—is very much narrowed. What arrangements preceded the withdrawal of the above-named Bills we are not yet informed. It may be that the Edinburgh Water Trustees have agreed to purchase the scheme of the Mid-Lothian Company, in which case their Bill will be practically unopposed.

Scarcity of water continues to be felt in the North. At Leeds the greatest economy in its use is insisted upon, and the authorities cannot afford to water the streets. The Corporation are proceeding as fast as possible with their new reservoirs, but it is said that a year and a half must elapse before a supply of water can be obtained from them.

At Widnes there is also a scarcity. The supply is taken from a well in the sandstone, from which there is an extra demand, for the reason that some of the shallower wells at the chemical works have become dried up by the drought. There is a talk of cutting off the water from the works, and limiting the distribution to a supply for domestic purposes. For the time being, a temporary pumping-engine is to be set to work at a new well; but it seems clear that the Local Board will have to provide additional sources.

At Wolverhampton, too, complaints of a deficiency are made, and the Water-Works Committee of the Corporation are considering the advisability of deepening their present well at Cosford, or finding a new source.

The Swansea Town Council have become alarmed at the great waste of water, and are thinking of restricting the supply. We fear the summer and autumn will be a trying time for water undertakings.

The Beverley Water Bill having been defeated, the Corporation of the borough are setting themselves seriously to the preparation of a scheme. It is strange that these authorities need the stimulus of a private company to drive them to the performance of a duty which they claim as peculiarly their own. Knowing better than any others the wants of their neighbourhood, they do nothing but talk until a company is started. Then they oppose, and sometimes, as in this case and at Truro, succeed in their opposition. No thanks are due to the Corporation, for they only come forward with a scheme in deference to a strong opinion expressed by the committee on the company's Bill.

The Town Council of Truro have now authorized the Sanitary Committee to take immediate steps for the construction of waterworks, and have applied for a loan for the purpose.

The Bill of the Wakefield Water Company has passed a committee of the House of Commons, but the opposition, which is very powerful, will be carried to the Upper House. The most interesting feature in the proceedings, which we report to-day, is the contradictory evidence of the geological experts, as

regards the site proposed for the reservoir, some alleging it to be perfectly safe, while others consider the embankment would be exposed to danger from landslips.

Goshen, in Massachusetts, is not a land flowing with milk and honey; but three reservoirs have recently burst there, destroying as many villages, and drowning 150 people. The loss of property is set down at more than a million of dollars.

The difficulty between the Halifax Town Council and the Horbury Local Board, relative to the supply of water to Soothill has been arranged, the Horbury and Soothill Boards each agreeing to pay an extra penny per 1000 gallons for the water taken. This arrangement is to be embodied in the Horbury Bill, which will now be unopposed by the Corporation of Halifax.

An interesting experiment has been made at Birmingham. An enterprising gentleman has converted nightsoil into artificial fuel by mixing it with something—breeze, probably—and a little gas tar, and then compressing it into blocks, and last week the chairman of the Sewage Committee witnessed some experiments made to demonstrate the heating power of the compound. According to the report, it proved to be superior to engine slack, and costs only half the price. A superior kind of the fuel, fit for domestic use, it is further said, can be sold at about half the present price of household coal. Birmingham, at the present time, offers a good field for the ingenious inventor, and he may assist in helping the Corporation out of some of their difficulties. We have, however, a strong opinion that nightsoil was intended for manure, and that its use for any other purpose than the fertilization of land is a contravention of the order of nature.

Burton-on-Trent seems to be getting into the same difficulties as Birmingham. They have a large quantity of deposit from the sewage-tanks on hand, and wherever they put it they are accused (not unjustly, perhaps) of creating a nuisance. Complaints are also made of nuisance at the sewage outlet into the Trent, and an injunction looms in the distance. Under these circumstances, the Town Commissioners have resolved to ask advice; but they seem inclined to adopt one of two plans—either the downward filtration system of Mr. Bailey Denton, or the treatment of the sewage by Dr. Anderson's process, which, it is hoped, would make the effluent water fit to be sent into the river.

The Town Council of Ipswich cannot decide on a sewage scheme. One committee on the question has displaced another, who proposed, if we remember rightly, to carry the sewage some distance down the river, and now, after months of deliberation, the new committee come forward with the proposal that the council shall authorize them to incur the expense of sending some of their members, with the medical officer of health and surveyor, to several places in which different systems are in use. The council decided to receive the report, but not to adopt it, and so the matter remains for three more months. This state of things is not at all creditable to the council; but, unfortunately, the sewage question has become a personal matter in Ipswich.

The Metropolitan Board of Works have declined the invitation of the Phosphate Sewage Company, who offered to place their works at Barking in the hands of the Board for examination. These works were recently visited by the Association of Municipal and Sanitary Engineers, which is, at present, a sufficient advertisement for the company. When they can show their process worked to a profit, business will come without touting.

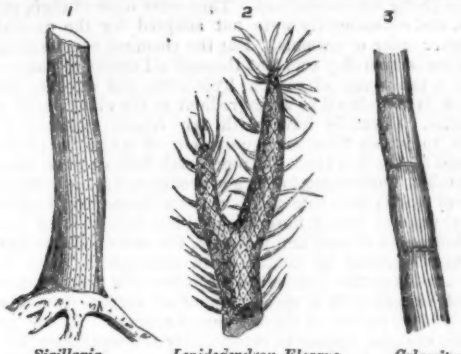
A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XIV.

Origin and Formation of Coal.

In tracing the succession of animal and vegetable life on the various surfaces which the earth has in past ages presented, the geologist notices in the old red sandstone, or Devonian rocks, underlying the coal measures, the remains chiefly of salt-water fishes, with impressions of seaweeds. This leads to the natural inference that these rocks once constituted the bed of an ocean. Ascending, we come to the mountain limestone, the organic remains in which, corals and shells, still indicate a marine origin for the deposit, but at the same time suggest a sea with a shallower bed. The ocean bottom was, in fact, becoming dry land, and when we arrive at the coal measures a very different condition of things is presented for observation. In these the evidences of a luxuriant vegetation begin to offer themselves, which could only have flourished on land dry or nearly so, or, at all events, only saturated with fresh water.

The vegetable origin of coal was first observed by the illustrious geologist, Hutton, and is now never disputed as regards true coal. Since Hutton's day, observers in this branch of study, among whom must be named Brongniart, Göppert, and Carruthers, have identified the remains of upwards of 900 species of fossil plants of the carboniferous period, and it is reasonably conjectured that hundreds of others existed, whose structure has been too completely destroyed to admit of their identification. Thus, remains of fungi, mosses, sedges, and grasses which must have flourished, are not found in coal; the plants chiefly recognized being ferns, calamites, sigillaria, lepidodendrons, and a species of pine allied to the Araucaria, or Norfolk Island Pine, but of gigantic size. It is a remarkable fact that these same plants are found in all coal-fields, no matter in what part of the



Sigillaria. *Lepidodendron Elegans.* *Calamites.*

world they exist, from the Arctic regions to Australia. A few of the plants from which the greater part of our coal has been formed are figured above. The most remarkable remains are, perhaps, the sandstone casts of enormous sigillaria, which have been found as much as 72 feet in length and 5 feet in diameter. They constitute the "coal pipes," so much dreaded by the miner—common in the Bristol and Newcastle coal-fields—and often the cause of fatal accidents.

Granting the vegetable origin of coal, it remains to account for the extraordinary fact that as many as 50 or 60 seams of coal, varying in thickness from a few inches to many feet, are, in some fields, superposed with interstratifications of clay, shale, or sandstones. Two hypotheses have been proposed, known as the "peat moss" and the "drift" theories. According to the former, each coal seam was originally a peat bog or forest; but, as it is well established that coal could only be formed under water, each of these forests must have become submerged and covered with mud or silt, the surface again become dry for a fresh growth of vegetation, again inundated, and so on, 50 or 60 times in succession over the same tract. The "drift" theory admits that while partial elevations and submergences of land may have happened—as, indeed, happens in the present day—the bulk of the vegetable matter which has been formed into coal has been carried by rivers and inundations into estuaries, and there deposited along with mud and sand. The supporters of both theories appeal to existing conditions for proof of the truth of their hypotheses, and it may well be that each expresses a partial truth. "No one," says a most intelligent writer on this subject,* "can look at the frequent alternations of coal, ironstone, sandstone, fire-clay, shale so argillaceous as to be little else than consolidated mud, and shale so bituminous as to be nearly as inflammable as coal, but must see at once the varying agencies of rivers, lakes, and estuaries; of inundations and submergences; of elevations into dry forests and jungle growth; and anon depression beneath the waters of deposit. We have thus a variety of agencies at work, but agencies which still find their analogues in existing nature; and when the student is reminded of the rafts of the Mississippi, the pine-barrens and cedar swamps of America, the peat mosses of Europe, the mangrove jungles of the Niger, the low shifting mudbanks and islands of the Ganges, the far-stretching sandy shores of Holland and Denmark, and the numerous coral reefs and lagoons of the South Pacific, he can have no difficulty in forming a conception of the shallow seas, estuaries, and submerged areas in which the sandstone, shales, and coal-beds of the carboniferous system were deposited."

A difficulty the geologist finds when he endeavours to explain the formation of coal is, perhaps, more apparent than real. From the fact that the strata in which coal is deposited are similar, and the organic remains in coal-beds are identical all over the world, it has been supposed that the same climatic conditions prevailed everywhere at the same time, and that the depositions were made cotemporaneously. The remains of the same plants are found in regions which are now tropical, temperate, and arctic; and, to explain this, it has been conjectured that the whole surface of the earth was at the same period of time exposed to a higher temperature, and enjoyed a different atmosphere to those which now prevail. It is not, however, unreasonable to suppose that the deposits of coal, say, in Melville Island and Australia, were not formed at the same period of time. Ages may have intervened between the deposit of the one field and the other, and in the interval oscillations of level, and varying distributions of sea and land may have brought to the one the climatic conditions of the other regions. The geologist necessarily speculates on enormous periods of time, and thousands of years are of no importance in his calculations.

An attempt, or rather several attempts have been made to estimate the space of time occupied in the formation of our coal deposits. Mr. Maclaren has estimated that a thousand years would be required for the formation of a bed of coal one yard thick. Professor Phillips has calculated that 500,000 years were occupied in the deposition of the South Wales coal-field, and Mr. Hull (Op. cit., p. 69) has estimated that it would require 640,000 years to produce the same coal-field. Sir Charles Lyell calculates that a million of years may have passed during the formation of the coal-beds of Nova Scotia. All these estimates, however, though based on given data, can only be regarded as "guesses at truth."

* Page. Op. cit. p. 155.

While uncertainty prevails on many other points respecting coal, the chemical changes which take place in the conversion of plant substance into coal may be said to be beyond dispute. The plants of the carboniferous era belonged to peculiar classes, some of which have no living representatives. They were none of them starch producers, and consequently were not adapted for the nourishment of the higher order of animals. But the chemical composition of vegetable fibre is tolerably constant through all orders of plants.

It is a compound of carbon, hydrogen, and oxygen, with which nitrogen is associated as an ingredient in the albumenoid matter in vegetables. Chemists have with fair reason assigned a distinct formula to woody fibre, one equivalent of which is represented as composed of C_{36} H_{22} O_{22}. Nitrogen will hereafter be seen to be of considerable importance to the gas producer, but in considering the change of woody fibre into coal it may for the moment be disregarded.

The change of woody fibre into coal has been effected by the combined influences of heat and moisture, the initial change having probably been assisted by contact with atmospheric air. The broad results have been the removal of a considerable proportion of hydrogen and oxygen with a small amount of carbon, leaving a proportionately large residue of the last-named element. At the commencement the changes appear to involve only the separation of carbonic acid and water. As they progress, marsh gas is evolved in association with carbonic acid, the final result of the changes being the formation of anthracite, a coal almost destitute of oxygen and hydrogen. The stages of the conversion may be illustrated by a quotation from a diagram exhibited by Dr. Letheby at his first lecture to the British Association of Gas Managers.*

Starting with woody fibre, the composition of which, as we have said, is constant, we have wood, C_{36} H_{22} O_{22}. The first change is into humus, C_{35} H_{20} O_{20}. As the alteration proceeds, we obtain lignite, or brown coal, C_{33} H_{15} O_9. The decomposition still proceeding, carbonic acid, and a small proportion of carburetted hydrogen, being separated, we arrive at cannel coal, C_{24} H_{13} O. A further change produces caking coal, C_{20} H_9 O; and, finally, we arrive at anthracite, C_6 H O, in the course of the formation of which nearly the whole of the oxygen and hydrogen in the original wood has been eliminated.† The gas maker will note with interest that the best coal for producing gas is that which contains the most hydrogen with the least oxygen; and next to a practical distillation, the best way of estimating the value of a coal would be to make an ultimate analysis of it.

Communicated Article.

DEPRECIATION OF VALUES OF COAL AND COKE PRODUCED THROUGH STOCKING.

By D. A. Graham.

In a recent contribution, we endeavoured to review the principles which should regulate the values of gas coals. The object of this article is to ascertain how far it would be economic and prudent to stock the coal to be used for winter's consumption, and to investigate the various sources of expense and loss sustained by storing for winter's consumption, as also to compare the sum of these extra costs and sources of loss, with the price originally given for the coal.

In the article before referred to, the standard coal was assumed to be one which should produce 10,000 cubic feet of 14-candle gas, and a value of 20s. was assigned to enable the statements adduced to rest on some definite basis of valuation. The cannel—like the coal—was selected from an article daily disposed of in the market, at about the price quoted—30s. per ton. This cannel producing a good coke and 10,000 cubic feet of 22-candle gas.

In the following estimates it will be convenient to repeat, and abide by these values, and the following table will show such of them, as it may be necessary to refer to in the following valuations:—

Illuminating Power.	Production in Cubic Feet.	Values corresponding to Returns per Ton, at 1s. 10d. per 500 or 3s. 8d. per 1000.	Values corresponding to Proportional Illuminating Power.	A difference of	Both Values added.
14·0 candles.	10,000	..	..	..	..
13·3 „	9,500	1s. 10d. less.	0s. 10d. less.	..	2s. 8d. less.
12·6 „	9,000	3s. 8d. „	1s. 7d. „	9d.	5s. 3d. „
11·9 „	8,500	5s. 6d. „	2s. 2½d. „	7½d.	7s. 8½d. „
11·2 „	8,000	7s. 4d. „	2s. 9½d. „	6½d.	10s. 1½d. „

These tables, as was before explained, showed a proportional decrease of illuminating power corresponding to the makes per ton the coal was capable of producing, giving a result which was, perhaps, nearly approximate to the case in point, where a coal, when stocked for a considerable time, not only lost a per centage of its gas-producing qualities, but probably a nearly proportional amount of its illuminating power as well, an observation more particularly applicable to nut coal, friable coals, unscreened coal, and to coals of inferior qualities, the best descriptions of lump coal not being so subject to deteriorate as those other kinds enumerated.

A shed capable of holding a stock of, say, 1000 tons, will, with the ground on which it stands, probably cost not less than £1000—interest on which amount, at 10 per cent., would form a charge of £100 on these 1000 tons of coal which were stored in it—and if taken at 5 per cent. would form a charge of £50; but striking an average of 7½ per cent., the interest would amount to £75, which divided by 1000 $\left(\frac{£75}{1000} = 1s.\ 6d.\right)$ would show that each ton of coal stocked was costing 1s. 6d. more for interest alone, than the same coal laid down before the retorts for immediate use; but the wages for stocking had also to be paid at, say, 9d. per ton, and if a railway were used, this 9d. would represent the value of a charge of 7½ per cent. on its probable cost, and the labour entailed in working it; for in the case of stores other than that in or very near the retort-house, the railway would not materially affect or cheapen the value of stocking—inasmuch as a railway for a store-shed would not be used throughout all the year, but only during the short period of time the stores were being filled; and further, it would cost 6d. per ton to bring that ton of coal from this store-shed to the front of the retorts. So that these several items would together form a charge as undermentioned:—

	s.	d.
Interest for use of store, at 1s. 6d. per ton	1	6
Interest for use of railway, or to pay for manual labour to store coal, at 9d. per ton	0	9
Cost of removal from stores, at 6d. per ton . . .	0	6
Together forming a charge per ton on the coal stored of	2	9

But if coal is stored, it is usually paid for when stocked; and if stocked to be used six months afterwards, the interest for the use of the value of the coal for half a year—at, say, 5 per cent. per annum—has also been lost, equal to 1-40th of 20s. = 6d. per ton; which, together with the previous charge of 2s. 9d., will collectively make a cost of 3s. 3d. per ton.

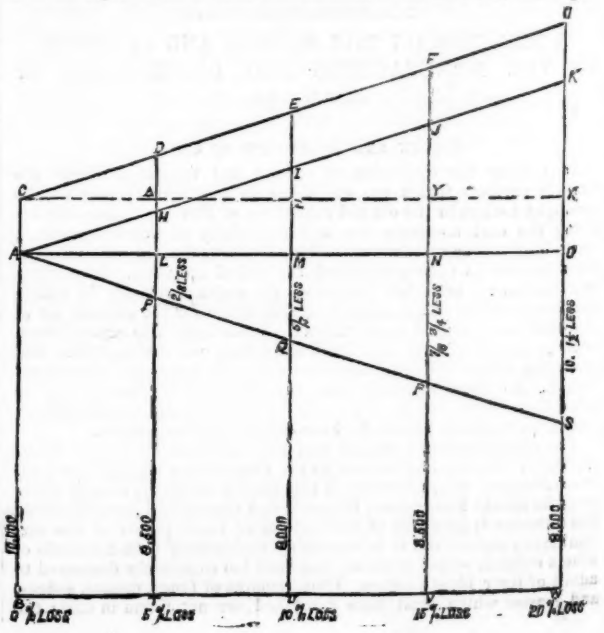
The values for the proportional fall of illuminating power and of the productions per ton were already quoted, but will be here retabulated; in this case showing the per centages of fall—a coal producing 10,000 cubic feet of 14-candle gas as formerly, being taken to represent the assumed standard of quality:—

Coal originally producing 10,000 *Cubic Feet of* 14-*Candle Gas, and worth* 20*s. delivered.—Cannel originally producing* 10,000 *Cubic Feet of* 22-*Candle Gas, and worth* 30*s. delivered.*

Per Centage of Loss.	Illuminating Power in Candles.	Return per Ton.	Decrease of Values corresponding to Decrease of Makes and Illuminating Power.	Value of Interest and Cost of Stocking, at 3s. 3d. per Ton.	Both Values added.	These Values, *plus* the original Cost of the Coal.
Loss.	Candles.	Feet.	Less than 20s.		s. d.	s. s. d.
0 per cent.	14·0	10,000	..	..	..	+ 20 = 20 0
5 per cent.	13·3	9,500	2s. 8d.	3s. 3d.	5 11	+ 20 = 25 11
10 per cent.	12·6	9,000	5s. 3d.	3s. 3d.	8 6	+ 20 = 28 6
15 per cent.	11·9	8,500	7s. 8½d.	3s. 3d.	10 11½	+ 20 = 30 11½
20 per cent.	11·2	8,000	10s. 1½d.	3s. 3d.	13 4½	+ 20 = 33 4½

From this table it appears that if a coal were purchased at 20s. per ton, delivered before the retorts, which, when laid down, was capable of producing 10,000 cubic feet of 14-candle gas—and if instead of using this coal it were stocked to be used, say, six months hence—if it were then found that it had lost five per cent. of its illuminating and productive power it would be worth 2s. 8d. less than its original value, 20s.; but as this loss of value had to be restored by the purchase of extra quantities of cannel, it would practically have cost, after this depreciation of quality was restored, 5s. 11d. more than the fresh coal at 20s., and it would now have cost 25s. 11d.

If 10 per cent. were lost, it would be worth 5s. 3d. less than 20s., but would cost 8s. 6d. more, or it had now cost 28s. 6d. as against 20s. If 15 per cent. of the illuminating and productive power were lost, it would be worth 7s. 8½d. less than 20s.; but after the depreciation of value was restored, would have cost 10s. 11½d.



* Report of the Proceedings of the Association for 1864, p. 14.

† The composition of these matters varies very considerably, and it must be understood that the above formulæ only express broad results.

more, or it had now cost 30s. 11½d. as compared with its original cost of 20s.; and if 20 per cent. were lost, the coal would be worth 10s. 1½d. less, but would have cost 13s. 4½d. more, or it had now cost 33s. 4½d. per ton as against its original value of 20s. delivered.

These principles of valuation may be illustrated diagrametrically, in such a manner as shall render their apprehension more clear than words alone might convey.

Thus, in the diagram, let the line A B equal the sum originally given for a coal producing 10,000 cubic feet of 14-candle gas—in this case assumed to be worth 20s. per ton—and let the ordinates P T, Q U, R V, and W S, equal the respective comparative values of coals producing 9500 cubic feet of 13·3, 9000 feet of 12·6, 8500 feet of 11·9 and 8000 cubic feet of 11·2 candle gas.

Further, let L P, M Q, N R, and O S be respectively equal to the several depreciations of value, as compared with the original value, A B, and let H L = L P, I M = M Q, J N = N R, and K O = O S, and let the line A C = the 3s. 3d. = the extra cost of stocking. Then, because A B is equal to U M, and represented the price originally given for the coal, but was depreciated in value to the extent of 10 per cent. of its original value, equal M Q, reducing the value of the coal in such proportion as made it worth only Q U, as compared with its original value, M U, and because this loss of value in illuminating and productive power had to be restored by the purchase of extra quantities of cannel, and the value of that loss was equal to M Q, it would cost as much as the value of this loss to restore the coal's original productive value; therefore it would cost M Q more than M U, but I M = M Q. Therefore, the coal, with its value restored by fresh purchases, would have cost I U, as against its original cost, M U, but it also cost I E to stock the coal; therefore this coal cost E U, as compared with its original cost, M U, or it had cost M E more than the price originally paid for it.

In like manner, had it lost nothing of its illuminating and productive power, it would have cost A C more than the sum originally paid, A B; if 5 per cent., B L more; if 15 per cent., F N more; and if 20 per cent., G O more.

So that, for a coal which had lost nothing by six months storeage, the loss would be represented by 3s. 3d.; for 5 per cent. loss, by 5s. 11d.; for 10 per cent. loss, by 8s. 6d.; for 15 per cent. loss, by 10s. 11¾d.; and for a coal which had lost 20 per cent. of its productive power, 13s. 4½d.

These figures show results which make it very questionable how far it will generally be prudent to stock more coal than shall be absolutely necessary to meet the possible emergencies of the depth of winter, and excepting the month's, six weeks, or two months supply stocked in the fall of the year, to meet these possible deficiencies of winter's supply, would tend to show that such a course would very rarely prove economical.

Ten per cent. of loss of illuminating and productive power must be within the experience of most managers who have stocked gas coals, and such a loss on several thousands of tons, amounts to so enormous a sum that it will generally pay much better to purchase fresh coals at considerably higher prices than those originally given for what may have been a lower summer value of the same article; we say *fresh* coal, and not merely coal which has been forwarded from a colliery, but *fresh* coal; for, as prices at present rule in the market, there is only too much reason to fear that they may be productive of another and greater evil—namely, that the colliery proprietor may relieve the gas manager from the necessity of stocking by stocking himself, and those who have once experienced the effects of this species of foresight will not be very desirous of repeating them.

It would, doubtless, enable a gas company to sell a coke comparatively free from sulphur compounds, but will have been the cause of the generation of considerable quantities of sulphuretted hydrogen, which will keep both the manager and his men very steadily employed, and will also considerably increase the expenses of purification—remarks which are equally applicable to coal which has lain exposed to the beating of the weather at railway sidings, and to the inclination stokers occasionally display of keeping themselves comfortably cool by watering the coal while charging the retorts.

The depreciation of the values of coke through stocking might be estimated in a somewhat similar manner; 10s. per ton would represent something like the present price which would keep a Lancashire gas-work clear of coke in the depth of winter; 13s. 4d. would nearly represent its spring and autumn values; and 15s. the price which it would fetch during the summer months. The question, then, is, how far it would be economical to stock coke in the depth of winter, with the view of selling it, say, four months afterwards, at considerably enhanced prices; 12½ per cent. of the weight of a ton of good sound coke was found to become breeze by six weeks outside exposure to the weather, and 23 per cent. of the weight became breeze by being exposed for four months to the weather; it will, therefore, be evident that only (100 – 23) 77 per cent. of coke stocked in the depth of winter could be sold four months afterwards. The question, therefore, is, what should this 77 per cent. fetch so that, in the first instance, no loss be sustained.

First, then, what are the expenses entailed by stocking?

If coke is sold immediately after it is manufactured, a very considerable amount of the receipts are paid in ready money, or at the longest, for large customers, in monthly or quarterly payments; but if coke is stored for four months, one-third of a year's interest is lost, at, say, 4 per cent. per annum $= \left(\frac{10s. \times 4}{100 \times 3}\right) = 1{\cdot}59d.$, equal to a charge of 1½d. per ton for the loss of the interest of 10s.

It takes about 9d. per ton to stock this coke, and granting that it will cost no more to load it after the expiry of the four months than it would do immediately after being manufactured, still every ton of breeze which had to be removed would cost not less than 10d. per ton for cartage, and about the half of that amount for labour for filling carts; which are together equal to a charge of 1s. 3d. per ton of breeze removed.

So that these several charges would amount to 1½d. + 9d. + 1s. 3d = 2s. 1½d. per ton of breeze removed.

But out of the 100 tons which were stocked for four months, 23 tons of breeze had to be disposed of, at a loss and cost of 2s. 1½d. per ton = 23 × 2s. 1½d. = £2 8s. 10½d.; but this 23 tons of coke might have been sold for 10s. per ton during the depth of winter = 23 × 10s. = £11 10s., and £11 10s. + £2 8s. 10½d. = £13 18s. 10½d.; so that the price the 77 tons of coke would have to be sold at, so that no loss be sustained, as compared with the winter's price of 10s., which would have kept the yard clear, would be £52 8s. 10½d.

$\frac{£77}{2}$ = £38 10s., and £38 10s. + £13 18s. 10½d. = £52 8s. 10½d.,

which £52 8s. 10½d., divided by 77 tons, would be equal to a charge of 13s. 7½d. per ton.

But the price which coke would sell at, at the time the yard was being cleared of stock, would be about 13s. 4d., showing a loss on this price of (13s. 7½d. – 13s. 4d.) 3½d. on each ton of coke stocked, and sold at that price (13s. 4d.); but the price which at first produced stocking would probably be not more than 11s. 8d. to 12s. 6d. per ton, so that the loss sustained through stocking should be estimated at the average of the price which produced stocking, and the prices which were current at the time the yard was cleared of stock, which would be equal to an average price of 12s. 6d. during those winter months when coke was held in stock,

$$\frac{11s.\ 8d. + 13s.\ 4d.}{2} = 12s.\ 6d;$$

so that the loss on each ton of stocked coke sold would be equal to 13s. 7½d. – 12s. 6d. = 1s. 1½d. per ton, showing that it would have been as economical to have disposed of the winter's stock at (10s. – 1s. 1½d.) = 8s. 10½d. per ton, as to have raised its price during the winter months to 11s. 8d., resulting in the accumulation of an exceedingly perishable commodity, a part of which only could be sold at a seeming profit, but, as these figures prove, at an actual loss of 1s. 1½d. per ton.

This 23 per cent. was the loss produced by stocking a hard, well-burnt coke; but we have seen coke which has been stocked for no longer a period of time, of which 30 to 50 per cent. of its tonnage had been converted into breeze, so that these estimates of loss are based on no extreme calculations, and they are not therefore calculated to exaggerate the sober facts of the case.

It will, perhaps, be unnecessary to further moralize on these results; they should be sufficiently apparent, without further comment as to make interested parties "wise unto salvation."

Correspondence.

GAS PURIFICATION.

SIR,—In your last number, Mr. Patterson says he "*described his patent to Mr. Evans and other officers of the Chartered Gas Company assembled at Horseferry Road.*"

I beg to contradict this so far as I am concerned, as I never have had any conversation with Mr. Patterson on the subject of his patent. If I had, I should certainly have told him pretty plainly what I thought of him and his patent.

I will leave your readers to judge of what Mr. Patterson considers being *frank* and *ingenuous*. I rather think he has confounded the latter word with *ingenious*.

F. J. EVANS.

Horseferry Road, May 16, 1874.

GAS MANAGERS BENEVOLENT-FUND.—Mr. Key, the president of the West of Scotland Association of Gas Managers, has sent us a letter, which want of space prevents us from inserting explanatory of the circumstances under which a large number of circulars soliciting aid for the benevolent fund were surcharged with postage on arrival at their destination. The Dumbarton postmaster authorized their transmission under the book-post regulations, but the authorities at Edinburgh insisted upon treating them as letters. Mr. Key is apprehensive (but we do not share in his apprehension) that the benevolent-fund may suffer through the circumstance that the gentlemen appealed to were charged a penny each on the delivery of the circular.

IMPORTATION OF PETROLEUM.—The importation of petroleum increased this year, to the 31st of March, £452,268; last year, in the same period, £205,929.

DEATH OF MR. DAVID BARCLAY.—This gentleman, who, for a period of about 27 years, was the engineer and manager of the Tottenham and Edmonton Gas-Works, died on Thursday last, May 14. He was greatly respected, and his death is deeply regretted by a large circle of friends.

DEATH OF THE GOVERNOR OF THE LONDON GAS COMPANY.—We regret to have to announce the death of John Robert Hall, Esq., for many years the able and energetic governor of the London Gaslight Company, to whose exertions that company is so much indebted for its present prosperous condition. It will be known to our readers that Mr. Hall was for many years the senior partner in the eminent firm of Messrs. Dyson and Co., parliamentary agents, and that since his retirement from business he has fulfilled the active duties of a magistrate for the county of Surrey, in addition to those of chairman of several companies of importance. He died in his 72nd year, leaving a widow and four children to lament his loss.

SOCIETY OF ARTS.—The Albert gold medal of this society, instituted to reward distinguished merit in promotion of arts, manufactures, and commerce, has been awarded for the present year to C. W. Siemens, D.C.L., F.R.S., "For his researches in connexion with the laws of heat, and the practical applications of them to furnaces used in the arts; and for his improvements in the manufacture of iron; and generally for the services rendered by him in connexion with economization of fuel in its various applications to manufactures and the arts."

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, May, 11, 1874.

Broadstairs Water (No. 2) Bill.—Reported from the Select Committee, with amendments.

Broadstairs Water (No. 1) Bill.—Committee adjourned till Monday, June 15.

The Nottingham Water Bill was read a third time, and passed.

Gas and Water Orders Confirmation Bill.—Second reading postponed to Friday, May 15.

Tuesday, May 12.

The Ystrad Gas and Water, Hartlepool Gas and Water, and Middlesborough Extension and Improvement Bills were read a third time and passed.

The Lymm Water and Tunbridge Wells Gas Bills, brought from the Commons, were read a first time, and referred to the Examiners.

Friday, May 15.

The Airdrie and Coatbridge Water Bill was read a second time, and committed for Thursday, May 21.

The Aberdare and Aberaman Gas, Grantham Gas, Hythe Improvement and Water, and Peterborough Gas Bills, were brought from the Commons, read a first time, and referred to the Examiners.

Gas and Water Orders Confirmation Bill.—Read a second time, and committed to a committee of the whole House on Tuesday, May 19.

HOUSE OF COMMONS.

Monday, May 11, 1874.

The Tunbridge Wells Gas Bill was read a third time, and passed.

The Aberdare and Aberaman Gas, Grantham Gas, Hythe Improvement and Water, and Peterborough Gas Bills, as amended, were considered; to be read the third time.

The Enniskillen Gas and Fairfield Local Board (Lords) Bills were read a first time, and referred to the Examiners of Petitions for Private Bills.

Requisition to withdraw their petitions against the following Bills were lodged:—Belfast Water, from Alexander Taylor; Musselburgh and Dalkeith Water, from Mid-Lothian Water Company. The *locus standi* of the owners and occupiers of property in Belfast (Martin Jaffe and others) against the Belfast Water Bill has been disallowed.

Tuesday, May 12.

Municipal Corporations (Borough Funds) Act, 1872.—A petition for alteration was presented from Rochester.

Mr. Arthur Mills asked the Secretary of State for the Home Department whether it is the intention of the Government to introduce any Bill to amend the Municipal Corporations (Borough Funds) Act passed in 1872.

Mr. Cross said the expediency of amending this Act had been under the consideration of the Government for some time, but he had been asked not to announce his final determination on the subject until he had received a deputation from the North of England that wished to see him on the subject. This he should be prepared to do early next week.

The Lymm Water Bill was read a third time, and passed.

The Leeds Corporation Water, &c., Bill (Lords) was read a second time, and committed.

Edinburgh and District Water Bill.—On the motion of Sir Charles Forster, it was ordered, "That the minutes of the evidence taken before the committee on the Edinburgh and District Water Bill, in Session 1871, be referred to the committee on the Edinburgh and District Water Bill."

Mid-Lothian Water Bill.—On the motion of Sir Charles Forster, the order, dated April 24, "That the Mid-Lothian Water Bill be committed," was read and discharged; Bill withdrawn.

The Chester Water Bill was reported.

The Musselburgh and Dalkeith Water Bill was reported. Parties do not proceed.

The Wakefield Water Bill was reported.

Wednesday, May 13.

The Horbury Local Board Bill, as amended, was considered; amendments made; Bill to be read the third time.

The Fylde Water Bill, as amended, was considered; clause added; amendments made; Bill to be read the third time.

The Wrexham Water Bill (Lords) was read a second time, and committed.

The Westleigh, Pennington, and Bedford Local Boards, and Nottingham Water (Lords) Bills, were read a first time, and referred to the Examiners of Petitions for Private Bills.

Edinburgh and District Water Bill.—On the motion of Sir Charles Foster it was ordered, "That the minutes of the evidence taken before the Committee on the Mid-Lothian Water Bill, in Session 1873, be referred to the Committee on the Edinburgh and District Water Bill."

Municipal Corporations (Borough Funds) Act, 1872.—Petitions for alteration were presented from Plymouth and Oldham.

Thursday, May, 14.

The Aberdare and Aberaman Gas, Grantham Gas, Hythe Improvement and Water (Queen's consent signified), and Peterborough Gas Bills, were read the third time, and passed.

The Ulverston Local Board Bill, as amended, was considered; amendment made; Bill to be read the third time.

A requisition to withdraw his petition against the Edinburgh and District Water Bill was lodged by the Earl of Dalhousie.

Friday, May 15.

The Skipton Local Board of Health and Dundee Water Bills were reported.

The Waterford Gas Bill was reported. Parties do not proceed.

Report, that the Standing Orders not previously inquired into have been complied with in the case of the Enniskillen Gas Bill (Lords), read; Bill to be read a second time.

Report, that no Standing Orders not previously inquired into are applicable in the case of the Fairfield Local Board Bill (Lords), read; Bill to be read a second time.

The Ystrad Gas and Water, Hartlepool Gas and Water, and Middlesborough Extension and Improvement (Lords) Bills, were read the first time, and referred to the Examiners of Petitions for Private Bills.

Municipal Corporations (Borough Funds) Act, 1872.—Petitions for alteration were presented from Liverpool and Stalybridge.

Petitions against the following Bills were presented:—Neath Corporation, by Neath New Gas Company (against alterations); Wrexham Water (Lords), by Cefn, Acrefair, and Rhosymedre Water Company.

Requisitions to withdraw their petitions against the Edinburgh and District Water Bill were lodged from (1) Duke of Buccleuch and Queensberry, (2) Marquis of Lothian, (3) Robert Dundas, (4) North British Railway Company.

HOUSE OF LORDS.

Tuesday, May 5.

(*Before Lord* Monteagle, *Chairman; Lord* Amherst, *Lord* Templemore, *Lord* De Vesci, *and Lord* Lyveden.)

ALLIANCE AND DUBLIN CONSUMERS GAS BILL.

Mr. Denison, Q.C., Mr. Richards, Q.C., and Mr. Pembroke Stephens appeared for the promoters; the Hon. Granville Somerset, Q.C., and Mr. Norwood for the Corporation of Dublin; Mr. Rodwell, Q.C., and Mr. Michael for certain gas consumers, petitioners against the bill.

Mr. Richards, in the absence of Mr. Denison, opened the case. He said the object of the bill was "to alter and amend the Acts relating to the Alliance and Dublin Consumers Gas Company, and to make further provision with respect to the quality and price of gas within the company's district; to confer on the company additional powers as to money, as to steam vessels and otherwise, and for other purposes." After reciting some of the provisions of the company's Act of 1866, by which the Alliance and Dublin Consumers and the Commercial Gas Company of Ireland, Limited, were amalgamated and incorporated, and were empowered to acquire the Dublin undertaking of the United General Gas Company, and also the agreement made between the company and the Corporation of Dublin, in that year, in reference to the price of gas, the learned counsel proceeded to refer to the company's Act of 1871, by which, in accordance with the desire of the corporation, the company consented to supply 20-candle gas at the rate of 5s. 6d. per 1000 cubic feet up to the 1st of July, 1874, at the rate of 5s. 4d.; up to the 1st of July, 1877, and thenceforward, at the rate of 5s. per 1000. That Act, he remarked, contained clauses for the revision of the price, but those clauses did not come into operation until 1881, so that for all present purposes they were entirely useless. Under the present bill the company sought power to supply gas of an uniform quality, not of 20 candles—which, it would be proved, was utterly and absolutely beyond what was required in Dublin, situated as it was entirely beyond the cannel district—but of 16-candle gas, over their entire district, at a uniform rate of 5s. 6d. per 1000, with a certain power of revision borrowed from the legislation in regard to some of the London companies, in the event of circumstances arising under which it would be impossible to supply gas of the quality and at the price named in the Act. The company also sought power to increase their share capital by £50,000 and their debenture capital by £12,500, and further to acquire a right to purchase steam or other vessels. The Corporation of Dublin had originally promoted a bill this session, seeking for compulsory powers to purchase the gas company; but they had withdrawn that bill, and now appeared as petitioners against the company's bill. Referring to the history of gas lighting in Dublin, the learned counsel said that prior to 1845 the city was supplied by two companies—the Hibernian and the Alliance Companies. In that year the Dublin Gas Consumers Company was registered, which bought up the Alliance Company, and became incorporated under their present title in 1847. The Hibernian Company became the property of the United General Gas Company, and these two companies continued the supply of Dublin. In 1865 the corporation advertised for tenders for the public lights, requiring a contract for 20-candle gas. Ultimately they made an agreement with the Alliance Company for 16-candle gas—the quality supplied over one-half, at least, of the metropolis. This contract turned out to be an extremely advantageous one to the corporation, and very disastrous to the company, the consequence being that the latter found it necessary to go to Parliament for further capital. In the meantime, the Commercial Company had arisen, and it seemed to have been contemplated that all the three companies should go to Parliament, where a ruinous struggle and desperate fight was promised. But, in order to avoid this, some arrangements were made, and it was proposed that the Alliance should buy up the Commercial undertaking and that portion of the United General Company's undertaking which was confined to Dublin. This arrangement was carried into effect, and ratified by the Act of 1866, so that from that time the "Alliance and Dublin Consumers Company" became the only company in Dublin, and they were the promoters of the present bill. When the agreement with the corporation, in 1866, was entered into, to light the public lamps with 16-candle gas, at 4s. 6d., the mains and pipes of the company were entirely free from assessment. In 1870, however, the corporation thought proper to assess the company's mains and pipes. The company felt this impost so grievous a burden, or rather they thought it was a burden so unfairly imposed upon them after the advantageous bargain the corporation had made with them, that, when in 1871 they went to Parliament, they went for three express purposes—first, in order to be relieved from the assessment; secondly, in order to obtain an alteration of the existing test-burner; and, thirdly, for power to raise additional capital to erect new gasholders. The corporation petitioned against the bill, the consumers also, and the bill was fought before a committee of the House of Commons for some days. Outside the committee-room negotiations were entered upon, and in the end an agreement was made, which was afterwards embodied in what might be called an entirely new bill, for scarce a fragment of the old bill remained. By that agreement the company undertook to supply 20-candle gas at 5s. 6d., with the reductions, from time to time, already referred to. They also agreed to withdraw the clause by which they sought exemption from taxation, and agreed to continue to be rated as heretofore. In 1872 the corporation determined to go to Parliament, first of all, for power to erect gas-works of their own, and secondly, for power to purchase the Alliance Company's undertaking. Before the bill came to be investigated an agreement was entered into between the company and the corporation, which contemplated the acquisition by the latter of the gas-works, upon the terms of paying 6 per cent. upon the shares, that 6 per cent. being secured, first, upon the income arising from the supply of gas, and secondly, upon a gas-rate to be levied by the corporation. The company having made this agreement, which was scheduled in the bill, obtained a *locus standi* to watch its progress, and see that no alteration was made to their prejudice. It appeared, however, that subsequent to the making of the agreement the Dublin Chamber of Commerce had some negotiations with the corporation, and the corporation then proceeded, without the knowledge of the company, and in bad faith, to make alterations in the bill, to the effect that the power to levy the gas-rate should not be exercised when the corporation should sell gas under the first cost of manufacture and distribution. The company felt that the corporation had broken faith with them, and they opposed the bill in Parliament, where, after a long and hotly contested battle, it was lost; whether from this cause or not he did not know, but it was absolutely impossible to suppose that Parliament would pass a bill incorporating as an agreement something which was a palpable deviation from the agreement, signed and sealed by both parties. The bill was, however, rejected; and the company incurred heavy costs in the opposition. They were also placed in this peculiar position. One of the clauses in the agreement with the corporation provided that the company should not, without the consent in writing of the Gas Committee of the corporation, enter into any contract for oil, cannel, or coal, other than for such as they might require to use up to the 1st of July, 1873; nor should they order or contract for the supply of any goods, commodities, or services save such as should be necessary for the ordinary working of the undertaking up to that date. The consequence was that, as coal was rising in price, the company found themselves prohibited from going into the market, anticipating the rise, and making contracts. At this time the price of coal sprang up enormously—it doubled, and in some instances trebled, and yet the company were tied down to 5s. 6d. per 1000 cubic feet for 20-candle gas! They found it impossible to do it, and they, therefore, applied to the Board of Trade for a revision. In the half year ending Dec., 1872, instead of paying their shareholders an 8 per cent.

dividend, they found it necessary to take £4000 from the reserve-fund, in order to pay 6 per cent., although at that time they were getting some benefit from the coals contracted for before the great rise took place. On the 30th of June, 1873, the profits of the half year's working were only £400, so that the company could pay no dividend, and on the 31st of December, 1873, there was an absolute loss on the half year's working of £10,000. It was impossible to suppose that any trading company could go on in that way, and accordingly the promoters applied to the Board of Trade, under the Gas and Water Facilities Act (1870) Amendment Act, 1873, for a revision, but their application was refused on the ground that it was "made by directors who are stated to have resigned their offices in consequence of charges of mismanagement." When the company got into such a disastrous state, as he suggested, from no fault of their own, but from the enormous rise in the price of the raw material, the first thing which the shareholders did was to blame the board. At that time, therefore, some of the directors resigned, and a new board was elected, and it was that board who were the promoters of the present bill. These directors determined not to proceed with the application to the Board of Trade, and in February last the power of revision which the Board of Trade possessed under the Act of 1873 expired. But they never could have given that relief from the agreement which the company required, and the only remedy open to the company was an application to Parliament. The corporation at the same time deposited a bill, and they wrote and proposed to the company that they should be allowed to purchase their undertaking upon the terms of paying 5 per cent. upon the capital, a proposition to which, of course, the company could not listen. The corporation bill had since been withdrawn, and this offer, therefore, was not in any way before the committee.

The CHAIRMAN: You say that you could not listen to a proposal of 5 per cent.

Mr. RICHARDS said, the bill of the corporation having been withdrawn, there was now no proposition to purchase. But the company conceived that, though they were the victims of an extraordinary rise in the price of materials, they had a fair case—the circumstances being beyond their own control—to come before Parliament to ask for assistance in their difficulties; and they did not think it reasonable that the corporation should take advantage of their distress, in order to buy up their undertaking at a cheaper rate than they contemplated the year before. After reading the correspondence which had passed between the parties, and briefly alluding to the provisions of the bill, the learned counsel proceeded to refer to the petitions. The first was that of the corporation, which alleged that there was already a power of revision of price given by the company's Act of 1871; but, as he (Mr. Richards) had already stated, that power could not be brought into operation until 1881, and it was not reasonable to suppose that, under the altered state of things, arising from the increased cost of coal, &c., the company could continue to supply gas on ruinous terms until that period. The corporation then objected to the proposed reduction of price and the illuminating power of gas. Neither party contemplated the marvellous alterations which had taken place since the Act fixing the existing price and illuminating power was passed, and it was unreasonable to oppose the alteration of legislation now sought. The petitioners alleged that the company could obtain all the relief they needed by applying to the Board of Trade, but he had already shown that those powers no longer existed; and, even if they did, they could not extend to relieve the company from the conditions of their Act of 1866. The corporation denied the expediency of reducing the standard of illuminating power, and stated that "the great majority of the gas consumers of the city and its vicinity look with apprehension" at the proposal. It was remarkable that 20-candle gas should be necessary in Dublin when 16-candle gas was considered sufficient in London. The corporation objected to the several clauses of the bill by which it was proposed to vary or alter the mode of testing the gas, the pressure at which it was proposed to be supplied by the company, the quality of the burner, and the lamp-governors. He (Mr. Richards) did not know that there was any substantial ground of objection as to these matters, but, if so, it was a question of clauses, into which at present he would not enter. Then the corporation objected to the proposed new capital, and they alleged that the existing capital was excessive, and, to a great extent, unproductive; "a large part having been, as your petitioners submit, wastefully and unnecessarily expended." He did not believe the committee would find there was any ground for this allegation, and it would be recollected that last year the corporation were willing to give the company 6 per cent. upon this capital. The corporation also demanded that the promoters should be put to strict proof that the increased price and reduced illuminating power of gas which they asked, were called for solely on the grounds of the present exceptional high price of coal and labour, and were not in any way attributable to defective management, excess of capital, unprofitable expenditure, and excessive leakage. This proposition was fair and reasonable enough, although it was rather odd that with all this "unprofitable expenditure and excessive leakage," the corporation were willing to purchase the undertaking last year. They now complained that the capital of the company had been "wantonly and extravagantly increased" since 1867, although, as he had already remarked, they were willing to take the concern and pay 6 per cent. upon that capital in 1873. The corporation further alleged that this was the cause why, for the last two half years, the company had been unable to pay dividends on their ordinary stock; the company, on the other hand, replied that it arose from the rise in the price of material and labour. The other petition, that of the consumers, alleged that their interests would be seriously affected by the provisions of the bill, and it stated before the select committee of last year, to whom the bill of the corporation was referred, that it was clearly proved "that the management of the company's business and undertaking had been marked by a degree of unskilfulness, inefficiency, and waste, rarely, if ever, paralleled, and that a reasonable improvement in these respects was alone required, in order to render the business of the company sufficiently remunerative, without any change in their gas-rate or reduction in illuminating power as proposed by the bill, to which your petitioners object." One word about that. Certain witnesses stated what the petitioners alleged, and the company, who had only a *locus standi* to see that no alteration was made in the bill of the corporation, had no opportunity to contest the statement. They had to stand by while counsel and corporation threw as much dirty water upon them as happened to suit their respective purposes. The petition then proceeded to object to the reduction of illuminating power, which it stated was equivalent to a rise of 20 per cent. in price, and alleged that it was not necessary, as the cost of coal and labour had recently been, and in all probability would continue to be, reduced; that the proposed terms of purchase by the corporation were based on extravagant estimates, that it was inexpedient the company should have power to acquire steam and other vessels; that the additional capital asked for was not necessary, &c., &c., on all of which allegations the learned counsel commented as he proceeded, and he concluded by submitting that the case of the company appealed to the committee's sense of justice. The absolute ruin of the company stared them in the face unless relief was provided for them, and such an event must be most prejudicial to the city of Dublin.

Mr. *John Stevenson*, examined by Mr. STEPHENS, said that he was for 30 years secretary to the gas company, and retired in October last. The company were in the first instance established by deed of settlement about the year 1843; at that time they were the Dublin Consumers Company, with a capital of £100,000. There were two other gas companies, the Hibernian and the Alliance Companies. The Dublin Consumers Gas Company purchased the works of the Alliance Company for £60,000. The undertaking was very limited in extent; the mains were only about 17 miles. When the Dublin Consumers Company first issued their prospectus the price of gas in Dublin was 10s. The company reduced their price at once to 7s. 6d., then to 6s. 8d., then to 5s. 10d., and then to 5s.; in 1854, during the Crimean War, it was increased to 5s. 10d., and subsequently reduced to 5s., 4s. 9d., and 4s. 6d., at which rate it continued down to the period of the amalgamation. The quality of the gas was at first 12 to 12½ candles. The bill of 1847 did not bind the company to quality or price; they could charge what they liked, and give what quality they liked. In 1864 there was very great discussion and agitation in Dublin on the gas question; great dissatisfaction was felt as to the quality of gas supplied by the Hibernian Company, and this led to the formation of a third company, the Commercial. In 1866 the contract with the Hibernian for the lighting of the public lamps was about to expire, and the corporation called on the three existing companies to tender for the supply of the public lights. The corporation asked the Alliance Company to tender for a supply of 20-candle gas; the directors objected, and declined to tender, on the ground that gas of this quality could not be economically or profitably used in Dublin. It was suggested at that time by influential citizens that an arrangement should be come to between the companies, and the Commercial Company were amalgamated with the Alliance, and powers were taken to purchase the Hibernian Company. The corporation were parties to one or two of the clauses of the agreement. The Act received the Royal Assent in 1866, and since then no other gas company had been started or formed in Dublin. The general price for gas was 5s. 6d., and the quality was 16-candles; the united district, under the Act of 1866, extended very nearly 22 miles, and was the largest district in the three kingdoms. The population of the district was over 500,000. An agreement was made with the corporation for the supply of the public lights, by which the corporation effected a saving of £5000 or £6000 a year. In 1871 the company went to Parliament for further powers, and were opposed by the corporation, and under the Act the company came under obligation to supply 20-candle gas. Previously they had been using Newcastle coal, but they were then obliged to use cannel coal, and their expenses were greatly increased. The coal for producing 20-candle gas, which then cost 21s. a ton, was now £2. The price of coal and labour had considerably risen, and the profits of the company in the second half year of 1872 were very largely reduced. About that time a correspondence commenced with the corporation as to the purchase of the works. The corporation made two offers—the first was rejected, and the second was agreed to; the agreement and correspondence was scheduled in the corporation bill of 1873. One of the clauses was struck out, and another was materially modified. In the amended bill the *mandamus* clause was struck out, and the gas guarantee-rate modified. The company protested against that, as it was their only security for the payment of the annuities, which, with interest, amounted to £41,000. The corporation did not undertake to give the company satisfaction, but it was understood that they intended to do so. By the agreement the company came under an obligation not to enter into any contracts for materials after a certain date, and, as matters turned out, the company sustained very heavy loss from the rise in the price of coal. The corporation bill was thrown out last session. He (witness) was not now connected with the company, but, from his knowledge of Dublin and the circumstances of the company, he believed that the present bill was absolutely necessary, in order to give them relief. It would not be a question of quality or success, but a question of light or no light. If through any circumstances the operations of the company were interrupted and discontinued, great damage and inconvenience might ensue. It was unreasonable to expect the proprietors of a company to supply gas at an actual loss. The quality of gas now proposed—16 candles—is the same as was supplied to Dublin previous to 1871, and gave general satisfaction.

Cross-examined by Mr. MICHAEL, *witness* said he thought, as a natural consequence, if the bill did not pass, Dublin and its neighbourhood would be left in darkness. The company could not go on working at a loss. There was no inquiry before Parliament in 1847 into the capital of the existing companies. There was an inquiry instituted by the Government, at the instance of the company, in the previous session. A report was made to Parliament, as the result of that inquiry, as to the capital of the Hibernian Company. (*Witness* gave particulars of the capitals of the respective companies.) There was a bill in Parliament last year for the transfer of the Alliance Company to the corporation; and there was a clause in that bill by which a rate was to be levied on the ratepayers, if necessary, to make up the interest to be paid to the shareholders from year to year. At the instance of the Chamber of Commerce that was struck out. The company, therefore, dissented from the bill, as they would have been left without any security. Many statements were made at that time, unfavourable to the company, which were untrue, but there was no opportunity to correct them. It was stated that the company was so badly managed that it formed an exception to the whole of the gas companies in the United Kingdom. He did not believe that statement to be true. The company did not, for the reasons given, take any steps to disprove it. The basis of the corporation case was that, if they were going to make such a profit, it was better that the undertaking should pass into their hands. He did not know that it was pressed upon the committee that there had been such bad faith exercised as between the Chamber of Commerce and the corporation, that the committee ought not to put any confidence in the statements made.

Mr. DENISON: That was the case—that no credit ought to be given to any of the corporation witnesses.

Mr. MICHAEL: Was it not a fact that the corporation engaged to give the company a guarantee which they subsequently withdrew, and that, while the guarantee was in force, the company allowed these statements to go before the committee without attempting contradiction?

Witness: Yes.

The CHAIRMAN: Who made the statements?

Mr. SOMERSET: I suppose I did.

The CHAIRMAN: They must have come out in evidence.

Cross-examination continued: Several engineers were called, who gave detailed figures as to the position of the company. They showed that there was a loss of 28 per cent. of the gas made unaccounted for. They stated also that the moment the undertaking passed into the hands of the corporation that loss would be remedied, and a great profit realized.

The CHAIRMAN: Who made that statement?

Mr. DENISON: Some corporation engineer.

Witness was interrogated by Mr. SOMERSET as to the resignation of the late directors of the company, the appointment of the committee of investigation, and other matters connected with the reorganization of the affairs of the company, and the application to the Board of Trade last autumn for a revision of price, &c. He stated, in further cross-examination, that the existing standard of illuminating power and price were fixed by agreement with the corporation in 1871. He was himself opposed to the introduction of 20-candle gas, believing that it could not be profitably and conveniently made in Dublin.

Re-examined by Mr. DENISON: He believed the agreement was a very foolish thing, and so did many other people. The late Mr. Barlow, and Mr. Hawksley, were strongly opposed to the arrangement. It was made by the directors, without advice, and contrary to the opinion of those with whom they were then consulting.

Mr. *Edward Fottrell*, examined by Mr. RICHARDS.

I am chairman of the gas company. The amalgamation of 1866 was not sought by us, but was forced upon us by circumstances. The increase of illuminating power to 20 candles in 1871 was not a spontaneous offer of ours—it was a matter pressed upon us by the corporation. I think it is a standard very unsuitable for Dublin, and it is very costly to maintain. We are obliged

to use 50 per cent. of cannel coal, which is a very expensive material in Dublin. Scotch cannel now costs 45s. a ton f.o.b., and freight and carriage add 9s. 6d., making the price 54s. 6d. delivered at the works. The production of coke from cannel is bad, and so large a per centage of it mixed with the ordinary coke deteriorates the whole mass. We have about 7000 chaldrons of coke at present in store, the bad quality of it preventing its sale. I see no prospect of a reduction in the cost of cannel. Our company are now working at a loss of about £12,000 a year, and I see no prospect of amelioration unless Parliament come to our assistance. Last half year our loss was nearly £10,000. Our leakage is more than I wish to see, but we are reducing it. Our district is the largest in the United Kingdom, the mains extending about 300 miles. Up to the period of our last Act 16-candle gas was supplied in Dublin, and I never heard any complaints. Persons have told me they like one as well as the other. I think, with the present price of coal and labour, 5s. 6d. per 1000 cubic feet for 16-candle gas would be reasonable. We should then not be able to pay 4 per cent. There is a certain scheme of revision proposed by this bill to which I think the corporation do not object. It is as nearly as possible identical with that agreed to in 1871. We propose to increase our capital £50,000, in shares at 7 per cent., with the usual borrowing powers. This capital is essential to the conduct of our affairs. Our present working capital, which is the difference between the paid-up and invested capital, is £60,000, is not enough, and ought, I think, to be increased by £50,000. Having to pass acceptances for our coal is a very bad thing. In addition to working capital, we require money for extensions.

Cross-examined by Mr. SOMERSET: With the exception of the alteration of quality of gas from 20 to 16 candles, we do not propose by this bill to vary the agreement with the corporation in 1866. We intend to go back to the price fixed at that time.

By Mr. MICHAEL: I have been chairman of the company since last September. I have been a director for 12 years. I think from the commencement of our working, our parliamentary contests have cost us £13,000, which has been carried to capital account. I cannot discriminate between the costs of opposing and the costs of promoting bills.

Mr. DENISON objected that his learned friend was not entitled to ask for this information.

The CHAIRMAN said malversation was very nearly charged.

Mr. MICHAEL said, as representing the consumers, he wished to show that gas could be produced more cheaply than was alleged. He took it that his questions were pertinent, as showing the amount of capital upon which dividend had to be paid.

The CHAIRMAN said under present circumstances the question might be asked.

Cross-examination continued: I will endeavour to give the information to-morrow. The average cost of all the coal used last year was 29s. 10d. per ton. I cannot tell how that is made up.

The further cross-examination was deferred until the production of the company's books.

Mr. *Frederick Stokes*, examined by Mr. STEPHENS.

I am chairman of the Commission of the Rathmines Township, which is included in the district lighted by the Alliance Company. I have made the contracts with them for the public lighting for the last 27 years, and we have always been satisfied. We have never had reasonable cause of complaint which the company have not redressed to the utmost of their ability. We are aware of the proposals in this bill as to reducing the illuminating power of the gas. We consider it is reasonable, and acquiesce in it as far as we publicly can. As a township, we are one of the largest consumers of the company's gas. We do not value 20-candle gas, and do not think it better than 16 candles as far as observation goes. I have 16-candle gas in my house, which is in another township, and I see no difference in the two. We have power as commissioners to establish gas-works of our own, but it has never been worth our while to do so. I am a citizen of Dublin. I think the public there sympathize with the company, and are prepared to make any reasonable concession as to quality and price. I know the circumstances under which the consumers opposition was commenced. I was at one time a member of the committee. I was induced to join it for the purpose of defeating the corporation bill. When that was withdrawn I ceased to be a member, as I would not be a party to oppose this bill. The feeling in Dublin is that the citizens would rather pay the gas company 7s. 6d. than let the corporation supply gas. The corporation proposed a tax which would have amounted to 2s. in the pound.

Cross-examined by Mr. MICHAEL: In our township we have power to appoint a tester for the gas, but have not thought it necessary to do so.

By Mr. NORWOOD: We have a contract at present with the company for a supply of $2\frac{7}{8}$ feet per hour of 20-candle gas, for which we have agreed to take 3 feet of 16-candle gas, paying the same price—viz., £2 12s. per lamp, including everything. Having these favourable terms, we should not like to be turned over to the corporation. Our contract was made during the increase in the price of coals. They have been falling since we made it.

WEDNESDAY, MAY 6.

Mr. *E. Fottrell* was recalled, and cross-examined at some length by Mr. MICHAEL as to the application by the company last year to the Board of Trade for a revision of illuminating power and price, as to the general working of the company, and as to how the capital was made up and expended.

Mr. *Jabez Church*, examined by Mr. RICHARDS.

I have been lately appointed the consulting engineer of the company. In my judgment the carbonizing department is in a very unsatisfactory state. Under my advice the whole of the retorts in the last house are being pulled down and reset on the most modern and improved principles. That work will be completed and ready for next winter's demands. It is rather an extensive proceeding. There are 252 retorts, 20 feet long, giving 504 mouthpieces; the whole of these are being taken out and reset. The purifying department requires a little attention, but that is of minor importance compared with the carbonizing department. We are thoroughly overhauling the mains and services, and making good all defects. In round numbers, there are 300 miles of mains, varying in size from 3 inches to 3 feet. The company have three stations, one in Dublin, another at Kingstown, and a third at Bray. The gasholders are in good condition, and there is a large surplus of storeage, sufficient for some time to come. It appears to me that the capital now asked for by the company is absurdly small; it ought to be £100,000. In my judgment 16-candle gas is quite good enough for the requirements of Dublin. The supply of 20-candle gas has proved a failure, and entailed great loss on the company. I think the best test-burner for 16-candle gas is that selected by the referees, known as Sugg's Argand burner. A flat-flame burner is the proper test-burner for 20-candle gas. I have made an estimate of the cost of 20-candle gas for the present year, and find that it will entail a loss to the company of 2s. 1d. per ton of coal carbonized, or a total loss on the year of £11,089 15s. 10d. To supply 16-candle gas will give them, upon the same calculation, 4s. $7\frac{3}{4}$d. net profit per ton of coal, or a total profit on the year of £24,730. That is considerably less than 5 per cent. upon their capital. I have worked out a comparison of the capital of this company with the capitals of the London companies, which shows that the former is not excessive, having regard to the circumstances of their extended area and mileage of mains. My opinion is that if they were to begin *de novo* to supply Dublin and the districts which they now supply, they could not construct works for the amount of their present capital.

Cross-examined by Mr. MICHAEL: I made a report last year to the corporation upon the works of the company. [Extracts from report read.] I said the works were well and substantially built, that a large portion of the buildings and apparatus was comparatively new, and that they contained a considerable amount of surplus power. That was perfectly true, and I say so now. The works were constructed for the manufacture of 14 or 16-candle gas, and the company were then supplying 20-candle. The moment 20-candle gas came into use, there was a considerable falling off in the quantity delivered. Having regard to that circumstance, the margin of power was then exceedingly large. I do not say that if the prayer of this bill is granted, it will necessitate an increase of expenditure, until the surplus power is exhausted. This year there has been a great increase [in the consumption of gas, which, if it continues, will soon exhaust it. With the settings, we shall make a much larger quantity of gas per mouthpiece, which will increase the producing power of the works greatly. In my evidence last year, I condemned *in toto* the carbonizing and distributing departments of the works. [Witness was further cross-examined at some length on the details of his evidence last year, and as to the leakage and the cost of the production of gas in Dublin.] I hope the flat-flame burner will not remain in the bill as the test-burner for 16-candle gas, because it is an improper standard. It will deteriorate the apparent value of the gas by two candles. I believe it was put into the bill to conciliate the citizens, but it appears not to have had that effect.

Re-examined by Mr. RICHARDS: I attribute the want of a market for our coke to the large proportion of cannel coke mixed with it. The flat-flame burner would cause a greater deterioration with 14-candle gas than two candles.

Mr. RICHARDS: My friend, Mr. Michael, has put various things to you about reducing leakage and so forth. Supposing you could adopt all the improvements he has suggested, and that he is right in his assumptions, would even that give you a dividend?

Witness: I have adopted all those suggestions in my estimate, with one exception, and that is with reference to leakage. Instead of taking that at $16\frac{1}{2}$ per cent., I have allowed 20 per cent., which is a very small difference. And, with reference to leakage, I may tell the committee that we are doing all that is possible to be done. We have saved already, in stopping mains and repairing service-pipes, 21 million cubic feet per annum, which is nearly one-tenth of the former unaccounted-for gas. The result of taking into consideration all Mr. Michael's suggestions is that I do not show a return of quite 5 per cent. upon the capital. I think in time the leakage may be reduced to 26 per cent., but I have assumed a reduction to 20.

Mr. *R. P. Spice*, examined by Mr. RICHARDS.

I have repeatedly visited the works of the company during the last seven years, and I know the position of the company in reference to their obligations to supply 20-candle gas at 5s. 6d. I know that they now ask to reduce it to 16-candle gas, at the same price. If I had been called in, I should have advised them to get a reduction to 14 candles, which may be put down as the universal standard. No one in Dublin ought to find fault with 16-candle gas at 5s. 6d. I think the consumers will find it quite as good for ordinary purposes as 20-candle gas, which is often not burned economically. In my judgment, a flat-flame burner for testing this gas is perfectly ridiculous, and I consider the deterioration in the light so tested is equal to three candles. The works of the company are now in a transition state; they have been labouring under great difficulties, owing to a combination of most unfortunate circumstances thrust upon or imposed upon them as the result of contentions of various sorts. As to their coke, there is no sale for it; it is a loss, instead of a source of profit, as it costs money to get it out of the way. The company must be relieved from the necessity of using such material as they have used. There is nothing but ruin before them unless it is done.

Cross-examined by Mr. RODWELL: The reduction from 20 to 16 candles, assuming that a proper price had been fixed for the latter, would not be a loss to the consumers, because they would pay less per 1000 for what they used. But in this case the price for 20-candle gas was fixed too low, and the company have drifted into their present disastrous condition ever since. In the year it was fixed they made a profit of £21,000, which has all since disappeared. With regard to the failure in their carbonizing department, that was not a matter of blame so much as of misfortune. They were advised to try a certain method of drawing and charging their retorts, which was not successful, and entailed on them an absolute and serious loss. They did it to save the cost of labour, and therefore in the interests of the consumers as well as of themselves.

Mr. *N. F. Cotton*, examined by Mr. STEPHENS.

I have been secretary and manager of the company since last October. Previous to that I was for 10 years in the employment of the corporation as superintendent of public lighting and gas examiner. From these circumstances, and my former connexion with the Hibernian Company, I am familiar with the gas supply of Dublin, and have had peculiar opportunities of seeing both sides of the question. It is absolutely necessary that this company should have an increase to their capital. We require to lay in a large stock of coals, as from the position of Dublin there is sometimes great difficulty in obtaining a supply. We also require to make extensions, for which we have not the means. The amount of capital asked for in the bill has been carefully considered by the directors, and I do not think it is excessive.

The CHAIRMAN: I think it is not so much contended on the other side that you do not want capital now as that you have wasted capital, and ought not to want an increase. Your best witness on the point says the amount asked for is ridiculously small, and that you ought to have asked for £100,000.

Examination continued: Our present capital compares favourably even with some of the best-managed London companies. [*Witness* handed in a table showing the income, expenditure, and profit per ton of coals carbonized, together with the capital and borrowed money per ton of the Alliance Company, as compared with the Crystal Palace District, Chartered, Imperial, and London Gas Companies.] Nearly the whole of our difficulties have arisen from the very scattered nature of our suburban districts. The works were originally constructed for the supply of 12-candle gas. In 1860 the illuminating power was increased to 16 candles, which entailed some expense upon the company. As regards their contract with the corporation, it has been most beneficial to that body and to the citizens. During the last six years the corporation have saved something like £4200 per annum on the contract made with the company in 1866. The company who had been supplying 12-candle gas then commenced supplying 16-candle gas without any increase of price. The company never paid their maximum dividend. The most they have paid was $8\frac{3}{4}$ per cent., and that for only one half year. At the time they were entitled to charge any price, and were not bound as to any minimum illuminating power, they only divided 7 and $7\frac{1}{2}$ per cent., and they then voluntarily reduced the price of gas. The present state of their affairs has arisen, first, from the great advance in the cost of coals; and, second, to the adoption of a system of charging and discharging retorts which failed. The revision clause in the bill of 1866 was the result of an agreement with the corporation, and similar clauses have since been introduced in some London bills. The clause was struck out by Lord Redesdale, before whom the bill went as an unopposed measure. The 16-candle gas we formerly supplied gave much more satisfaction to the consumers than the 20-candle gas. I was not connected with the company at the time the change was made; but I objected to it, and told the corporation what the result would be—that the consumers not being used to it would not burn it properly. I believe that 14 candles would be better for them even than 16. Paris is lighted with 12-candle gas, and so is Brussels. In London, six of the companies are under obligations to supply only 12-candle gas. The system of testing gas in Dublin is extremely strict. I agree with Mr. Church in his estimates as to the cost of coal, and the profits to be derived from the working,

assuming the leakage reduced to 20 per cent., which, under the best possible management, is the utmost to which we could expect to reduce it. We have taken steps with that object, and we have succeeded so far that I think there will be a saving of £3500 a year.

Cross-examined by Mr. RODWELL: The company could not well reduce their leakage hitherto, because, during the last six years, the streets were continually being torn up for the introduction of water-pipes and sewers. I gave evidence last year that the transfer of the works to the corporation would be advantageous to the citizens. If they had acted on my advice they would not have sustained a large deficiency, because they would have gone to the Board of Trade for a revision, which the company could not obtain.

By Mr. SOMERSET: The agreement of 1866 is to remain in the same state as it was scheduled in 1871 for the remainder of the contract with the corporation, with the exception of a change in the test-burner and the reduction of illuminating power. After that time the corporation are to be supplied at the lowest price charged to private consumers. I do not think it is fair that the public lights should be supplied at such a price that the private consumers have to make up the difference. I always said they were entitled to a reasonable reduction, which I think would be about 7½ per cent. I should not object to the increased price which the bill asks that the company may be allowed to charge being limited to two years.

Mr. RICHARDS: The directors do.

Cross-examination continued: I know the provision in clause 5 as to the pressure—viz., 6-10ths and 8-10ths. I think it is too much in a city like Dublin, and that 5-10ths would be sufficient. In a manufacturing city it would not be too much, but in Dublin it is little short of waste. We have not 200 customers who consume gas all night. With regard to section 6, I say that 5-10ths pressure is a mistake for testing gas. We never could test the pressure, though we have been trying for years; it is an utter impossibility.

Re-examined by Mr. RICHARDS: I have no authority from the directors to say that they would not object to the limitation of price, &c., for two years. I agree with the other witnesses that to test 16-candle gas with a flat-flame burner is injurious to the gas, and does not exhibit properly its illuminating power.

Mr. *R. J. Ennis*, clerk to the Kingstown Commissioners; Mr. *D. M'Birney*, chairman of the Kilmannan Township Commissioners, and Mr. *W. H. Bewley*, of Pembroke, were called to prove that the provisions of the bill were satisfactory to the consumers in their respective townships.

Mr. *T. Hawksley*, examined by Mr. RICHARDS.

I know the works of the Alliance Company. I believe they have double the length of pipes, in proportion to the gas sent through them, that most companies have. The works of the company, with the exception of one retort-house and one gasholder, are, generally speaking, in good order. That retort-house is being rehabilitated. The experiment with steam-stoking apparatus which the company made was not bad management, but it was not fortunate. It was an experiment adopted in consequence of the disorderly conduct of the workmen, and the strikes. I consider 16-candle gas is an exceedingly good quality of gas, and quite sufficient for the purposes of Dublin. Twenty-candle gas cannot be produced without a large quantity of cannel, which is a scarce and dear article. I think 5s. 6d. is a reasonable price to charge—it is the price which, on revision, the Chartered Company are allowed to charge, and they are in an immeasureably better position. If the Alliance Company can reduce their leakage, which will be a slow and difficult operation, that price will probably give them more than 5 per cent. I say that a flat-flame burner is not a proper test-burner for 16-candle gas. The effect of a flat-flame burner is that the gas comes into contact with too large an amount of atmospheric air, and the carbon is burned off too rapidly. The carbon ought to be burned with just that quantity of air which will leave it for a considerable time incandescent in the flame. When it is incandescent it is giving off light, but you cannot adjust the air to a flat-flame burner properly to the carbon in the gas. The Argand burner, with large apertures and a small pressure, is the proper mode of testing this gas. You cannot get more light out of the gas than is in it, but you may, by an improper burner, conceal its true value. As to the proposed increase of capital, I think it is too small, and I told the directors so when I was last in Dublin. They will have to come to Parliament again in five years. Their present floating capital of £60,000 is only 10 per cent. upon their total capital, which is, in my opinion, an absurdity, or, at all events, a timidity.

Cross-examined by Mr. MICHAEL: The additional capital asked for in the bill will be required for extensions from time to time, and for putting the existing works in order as regards the retorts. The leakage at the present moment is excessive, partly attributable to the enormous length of the mains. It ought to be reduced to 20 and, probably, 16 per cent. The existing per centage may arise, to some extent, from defective service-pipes and meters being out of order. It is possible also that the public lights are taking an over quantity of gas. Some of the mains, I should think, must be broken, because, during the last few years, the corporation have opened the streets very largely for the insertion of their new system of water-pipes, and I believe there has also been sewerage done. All these things, of course, contribute to increase the leakage. I have never calculated the sum that would be required to reduce the 28 per cent. leakage to 16 per cent. Under ordinary circumstances, the opening of the ground and making good the pipes would have to come out of revenue, and not out of capital.

Mr. MICHAEL: Can you tell me how much you think will be expended out of the £50,000 of new capital in providing steam colliers for carrying the coal for this company.

Witness: Steam colliers are rather expensive things. I should think they would cost from £8000 to £12,000 each.

Mr. MICHAEL: How many are calculated for in this £50,000 to be provided by the company?

Witness: If I had my way, and the company took my advice, I would say none.

Cross-examination continued: At Nottingham there are about 130 miles of mains, in Dublin 300. The same quantity of gas is supplied in both places. In the former the price is 3s. 4d. in town and 3s. 10d. in the country, and the parliamentary standard of illuminating power is 12 candles, though they supply 16. The reduction of the leakage at Dublin, as I suggest, would be equivalent to a saving of £11,000, but it will take some years to accomplish it. About 9500 or 9600 cubic feet of 16-candle gas should be made from a mixture of 25 per cent. cannel with Newcastle coal. The cannel by itself would produce from 10,500 to 11,000 feet of 32-candle gas. Its present cost, I should imagine, is about 50s. a ton, delivered in Dublin. The cost of the mixed coal would be about 27s. 6d., which makes the cost of the gas 3s. 8d. per 1000. From that the value of the residuals has to be deducted—about 1s.—leaving the price 2s. 8d. To this must be added 1s. 5d. for the costs incident to manufacture and establishment, and as there is 5 per cent. dividend and interest to be paid on nearly £700,000, and the quantity of gas sold is 600 millions annually, a further 1s. 1½d. must be added, making the total cost 5s. 2½d. per 1000 feet, without allowing anything for contingencies or for reserve. As to the flat-flame burner, I protested against its introduction for testing. I think the company never made a greater mistake than by putting it into their bill. The sooner they get rid of it the better.

The CHAIRMAN: It is quite plain that it is a mistake in the bill. I suppose you are agreed as to that.

Mr. RICHARDS: I should say so. I can only say for myself, knowing something about gas, that it is clear there must be some misapprehension. Mr. Hawksley seems to have explained it. It was introduced originally against his advice.

Re-examined by Mr. RICHARDS: The Alliance Company suffer from excessive rating. The corporation make the rates, and, I think, taking them altogether, they amount to something like 9s. in the pound per annum, which is very heavy. At Nottingham we use the 15-hole Argand burner for testing purposes—the same burner which has been adopted by the Government—since the Nottingham Gas Act was passed, and which is prescribed in all the Provisional Orders which come before Parliament for confirmation. I think the existing capital of the Alliance Company is a full amount, but, looking to the immense extent of their district, and to the fact that they have double the ordinary amount of pipeage, it cannot be so much in excess as otherwise I should have thought. I do not think it is largely in excess, but it is somewhat heavier than in most cases. When their carbonizing department is set right, they will be able to continue the supply for some little time with their present plant.

THURSDAY, MAY 7.

Mr. GRANVILLE SOMERSET said, before his learned friend called any more witnesses, he wished to ask a question. The evidence given on the previous day had placed the case in a new aspect, and altered the basis upon which the corporation had considered the bill. As he understood the matter, it was now proposed to change the test-burner, and he wished to know whether this course was to be sanctioned by the committee at the eleventh hour. According to Mr. Cotton, the burner inserted in the bill was the proper one, and he wished to know if the company were going to change it, against the wishes of their principal advisers.

The CHAIRMAN: If Mr. Richards likes to give you the information you desire, we should be very glad, but we cannot compel him. We hope he will tell you, but we cannot request him to do so.

Mr. SOMERSET: The test-burner inserted in the bill would give us what—although called 16-candle gas—would really be 18-candle, and it is now proposed to give 16-candle gas only, the present power being 20.

The CHAIRMAN: The whole case has not been argued, but the cross-examination was directed to the question that you are to have 16-candle gas instead of 20, if this bill passes.

Mr. SOMERSET: 16-candle gas by this particular burner, which will make practically 18-candle gas. Now we are to have 16-candle gas instead of 20, rather than 18 instead of 20.

Mr. RICHARDS: I may state at once that if my learned friend means to say there is anything like an understanding on our part or on theirs that we should stick by this flat-flame burner (though we most distinctly say it is not the proper test), still, so determined are we to act with the very best faith towards the corporation and towards the consumers, that we are prepared to leave the matter in the hands of the committee. If the corporation are of opinion that it would be a breach of faith on our part, we have no desire for a moment to press for the Argand burner instead of the flat-flat burner. We are prepared to give up the question of test-burner if the corporation will withdraw from their opposition.

The CHAIRMAN: We do not want these points left to us; we would rather you settle them amongst yourselves.

Mr. SOMERSET: I do not think it would be fair to the corporation to call upon them to make any such declaration. We had no desire to come here, and we only appear in consequence of the nature of the provisions contained in the bill.

Mr. RICHARDS: Then, all I can say is, as I said before, that although I conceive it to be not the proper nor the best test-burner, nevertheless, rather than have the slightest imputation cast upon us of bad faith towards the corporation, we will abide by the burner as it stands in the bill—the flat-flame burner. Are we to understand that my learned friend will withdraw his opposition upon the reduction to 16-candle gas, as measured by the flat-flame burner?

Mr. SOMERSET: I do not think the opposition of the corporation has been of that nature that my friend has any right to complain, and therefore, without answering his question, I will conduct my case in my own way.

The CHAIRMAN: If I understand you (Mr. Richards) rightly, you say that you will give up the proposed alteration of the burner, but you expect the corporation to give up their opposition.

Mr. RICHARDS: That is so.

Mr. SOMERSET: I do not see any fairness in that matter. We are brought here upon a certain condition of things, as contained in the bill, and it is now suggested that that state of things shall be altered in the most material point. My learned friend says he will keep the burner as it is in the bill. If so, I am content so far.

Mr. RICHARDS: If you will accept the 16 candles.

The CHAIRMAN: Let us have it settled one way or the other. Do you absolutely give up the change, or do you make it conditional?

Mr. RICHARDS: We make it conditional. We say that if we are to test it by the burner it will practically give them 18-candle gas. But my learned friend deliberately asks us to give him 18 candles.

The CHAIRMAN: Are you willing to abide by the bill as it stands on this point if Mr. Somerset accepts 16 candles?

Mr. RICHARDS: Yes, my lord.

Mr. SOMERSET: I am ready to agree to this, because I never intended to oppose it. As far as the actual candles are concerned, I shall not object if the burner is kept as it is in the bill. I do not know what "conditional" means; I can go no further than that.

The CHAIRMAN: The bill, as it now stands, gives a certain standard. We must take it that, until Mr. Richards has declared he will alter it, that he intends to leave it as it stands.

After some further conversation, Mr. MICHAEL said the matter now in dispute first arose upon his cross-examination, and he was extremely surprised that there should be any proposition to alter the preamble. He submitted that the promoters had no power to do it without the consent of the parties on the other side.

Mr. RICHARDS contended that there was nothing in the preamble which limited the matter. It stated that "whereas it is expedient that the obligation upon the company to manufacture 20-candle gas should be repealed, and that a standard of illuminating power more in accordance with local requirements, and capable of being maintained with certainty, should be established, and that such provisions as to quality, price, and testing of the company's gas should be made as are hereinafter expressed——" This was general language, and admitted of an alteration of the testing clause.

Mr. SOMERSET said he was prepared to go on with the bill as it stood.

Mr. RODWELL wished before that was done to refer to a paper which had been placed in his hands, and which he understood to be a settlement of the question between the consumers and the promoters.

Mr. RICHARDS objected that the memorandum, though it contained certain preliminaries of an arrangement, the result of discussions between the parties, could not be regarded as the settlement of the questions at issue.

Mr. RODWELL said the chairman of the company was the person by whom the document was written, and who had given assent to it. It was considered and accepted by all parties as a settlement of the matter.

Mr. RICHARDS said, on Mr. Fottrell's behalf, he must give an emphatic denial to that statement.

The CHAIRMAN said as it was not formally agreed to and signed, it could not be regarded as a settlement, and the matter should proceed no further.

Mr. *Joseph H. Fergusson*, examined by Mr. STEPHENS.

I reside at Blackrock, in the county of Dublin, and am a commissioner of the Blackrock Township and chairman of the Sanitary Commission; the commissioners have had the provisions of the bill submitted to them as to price and quality, and a committee has reported in favour of them; we are to have 16-candle gas, which is satisfactory. I never heard any complaint as to the lighting, except when, on moonlight nights, the public lamps have been burning all night, some of the inhabitants have complained that the lighting should be more economically carried out. I think 16-candle gas would be better for Dublin than 20-candle. For my own part I prefer it, for the reasons which have already been explained to the committee, and although we had power to call for 20-candle gas, we have never exercised it. From the whole of the district, including Kingstown, Blackrock, Dalkey, and other townships, there is no opposition, except from the Corporation of Dublin and a few of the consumers. All the townships have local governing bodies, and I understand that they have not petitioned against the bill.

Cross-examined by Mr. RODWELL: I do not know that any arrangement was made with the people of Kingtown by which their opposition was got rid of.

The CHAIRMAN: The fact is we only have two opponents, and we do not want to know why there are no more.

By Mr. NORWOOD: I did not hear Mr. Stokes say that as far as Rathmines was concerned they had obtained highly favourable terms from the company. I was not here during a portion of his examination. From my knowledge of Mr. Stokes I believe him to be quite incapable of misleading any one, or stating anything wrong.

Mr. *Alexander Redmond*, examined by Mr. STEPHENS.

I am a merchant in Dublin, and one of the aldermen of Dublin; I reside in Kingstown, and am acquainted with the gas supplied in both districts; I burn 16-candle gas in Kingstown and 20-candle gas in Dublin; I prefer to burn the former; the price charged in the bill is fixed at 5*s*. 6d. per 1000, and as the company require relief, I consider that for a certain limited period that would be a reasonable price. I approve generally of the provisions of the bill.

Witness was not cross-examined.

This was the case for the promoters.

Mr. RODWELL then addressed the committee on behalf of the citizens and consumers. He thought that his clients were entitled to full consideration, and that they were fully capable of forming an opinion upon the merits of the bill, especially seeing that last year they had prevented the corporation from entering into a ruinous bargain. A point had been made by the promoters that the opposition was confined to the corporation and the consumers, but he asked who were more deeply interested in a scheme of this character than the citizens and the consumers? He took it that the steamer portion of the scheme was given up.

Mr. RICHARDS would not say that it was given up, but he doubted whether the funds provided in the bill would enable anything to be done in that direction.

The CHAIRMAN: You wish to have the power retained in the bill, but do not pledge yourselves to make use of it?

Mr. RICHARDS: Yes, my lord. I consider it is one of those things that we ought to have.

Mr. RODWELL said he thought the steamers had been condemned by his learned friend's own witnesses. At all events, the proposal was deprecated by Mr. Hawksley, one of the company's own witnesses. He (Mr. Rodwell) hoped, however, that the fate of the bill would be such as would prevent the company from squandering any more money for years to come upon speculative improvements. He contended that there had been a wanton and wilful refusal on the part of the company to avail themselves of the advice given them last year to effect savings. Even according to the evidence of Mr. Church, the recommendations made to the company from time to time had been altogether disregarded, and, having been so wilfully negligent, were they entitled to come to Parliament and ask for indulgence? What they virtually said to the committee was this—"We cannot help it, but our own affairs are very bad. We have had bad management—we have lost our money—but we prefer to go to Parliament rather than to take the money out of our own pockets in the shape of a reduced dividend, or no dividend at all, and to ask Parliament to enable us to increase the price of our gas, to reduce the illuminating power, and to raise additional capital to enable us to go on." The improvements spoken of last year might, according to Mr. Cotton, have all been completed by the 1st of July, 1874, and the result, by the company's own admission, would have been to effect a saving of £30,000 a year. No doubt Parliament had declared, by its general legislation, that, if a company could show that their profits were insufficient to give them a dividend, they should be entitled to ask for relief, but this was on the assumption that they had used due diligence, and that the diminution in their profits had arisen from the excessive price of coal or labour. It never could have been intended by the Legislature, when they passed those Acts in favour of gas companies, and for the protection of those who had invested their money in gas undertakings, that, if it could be clearly shown that a particular company had declined to invest their capital in a way which would enable them to effect large savings, they should still be entitled to relief. Such a case never could have been contemplated by the Legislature at all. It was suggested that the company had no capital, and yet it turned out that since they were in Parliament last year they had expended from £60,000 to £70,000.

Mr. RICHARDS said that was not so.

Mr. RODWELL said that at any rate they had expended that sum since 1872; and what was the threat they held out in the event of their bill being defeated? It was suggested that if they did not succeed in obtaining the relief they asked for they would be bankrupt, and be plunged in darkness. He ridiculed such a notion, and said that his clients, as consumers, in their own interests, would not have opposed the bill if they considered such a result possible. They had already a reduction in the price of coal, and a further reduction was expected, so that the company would be in a better position than they had been for some time. Under these circumstances, the consumers asked that the application for £50,000 additional capital and £12,500 borrowing powers should not be granted. If the company had been losers it was in consequence of their own mismanagement and gross neglect, and to give them the power of increasing their capital would be to offer a premium to gas companies to conduct their business carelessly and negligently, to mulct the public as far as they could, to extract the highest price they could obtain, and instead of applying their capital to the legitimate purposes of their business, to apply it to other purposes, with the object of swelling their profits, and obtaining a larger dividend than they were entitled to by their Act of Parliament. With regard to the other parts of the case, his clients, as consumers, were not unreasonable. They were willing to share the loss which had been sustained. They trusted it would be a lesson to the Alliance Company, and they hoped in future that the company would conduct their business on a more satisfactory basis. What the consumers said was this—"Let them reduce the illuminating power from 20-candle to 16, but do not let us pay more than the consumers in other large towns are called upon to pay. We say that 5*s*. per 1000 is quite sufficient, and, with care and proper attention to their business, they will be amply remunerated." The case was, in his opinion, one of principle rather than of detail, and, as such, he left it in the hands of the committee.

Mr. RICHARDS: Your opposition is reduced then to a question of 5*s*. or 5*s*. 6d. per 1000?

Mr. RODWELL: Sixteen-candle gas and no capital.

Mr. *Thomas Pim*, examined by Mr. RODWELL.

I am a partner in the firm of Pim Brothers, in Dublin. My father was member for the city in the late Parliament. We carry on an enormous business, and pay about £1200 a year to the gas company. I was a witness in 1866, when the gas bill was dismissed. In 1871 I also appeared in opposition to the bill, on the ground that the company were proposing a new burner, which would save them two candles in power, to the detriment of the consumers. We want 16-candle gas at 5*s*., as tried by the same burner we consume it by. We should be content with that. The company propose to use a burner which would give two candles in power in their favour. In 1873 a committee was appointed by the corporation to consider the gas question, when it was proposed that the works should be taken by the corporation. We had estimates made, and the result of our investigation was, that we were of opinion that the corporation should take the works, provided that the citizens should not be rated at more than 6d. in the pound to make up the deficiency. By the bill, as it was presented to Parliament last year, the total loss to the citizens would have been about £50,000 a year. The Chamber of Commerce accordingly opposed the scheme, and succeeded in defeating it. As consumers, we consider that we should not be called on to make up the deficiencies occasioned by the bad management of the gas company. There can be no doubt that the undertaking has been very badly managed, and the funds of the company squandered. This opposition was got up in Dublin two months ago, when we saw the two bills which had been presented to Parliament. The first was a bill introduced by the corporation for the purchase of the gas-works, which occasioned great surprise, seeing the fate of the bill last year; the other was the present bill, which empowered the company to raise additional capital, to decrease the power of the gas from 20 to 16 candles, to raise the price, and to empower them to purchase steamers. Seeing that the price of coal was falling, we considered that any increase in the price of gas was unnecessary and perfectly unfair towards the citizens.

At this stage of the inquiry, and before the examination in chief of Mr. Pim was finished,

Mr. RODWELL announced that an agreement had been come to which got rid of the opposition. A paper had been placed in his hands which he had not read, but which, he presumed, was correct, as it bore the signatures of Mr. Fitzgerald, on the part of the company, Mr. Barry, on the part of the corporation, and Mr. Watson on the part of the citizens and consumers.

Mr. RICHARDS said a copy of the agreement had that morning been placed in his hands, and he had not been able to make himself master of the terms.

The CHAIRMAN: I presume it will be necessary to alter a great many clauses in the bill?

Mr. NORWOOD; Yes, my lord.

Mr. RICHARDS: It would be convenient that we should adjourn now, so as to afford time for a settlement of the clauses.

The CHAIRMAN: Shall you be ready to proceed at two o'clock?

Mr. RICHARDS: That would be hardly possible. I believe that the whole framework of the bill will have to be altered.

The CHAIRMAN: If you are going to introduce any extensive alterations, you must take care you do not interfere with the rights of persons who are not represented.

Mr. RICHARDS: Of course.

The CHAIRMAN: I have sometimes seen compromises of this nature proposed which would materially affect the rights of individuals. There are a great many citizens of Dublin whose rights might be interfered with, and it will be our duty to prevent that.

Mr. RODWELL: I think I see the spirit of the agreement. My learned friend should have said, however, that the introduction of these clauses into the bill would be subject to your lordships consent. It will be our duty to bring them before you in such a shape that you will at once see their bearing.

The CHAIRMAN: All I have to say is that you must take great care that you do not trample on the rights of persons who are not before us.

Mr. RICHARDS: The agreement is as follows:—"The price of gas, 16-candle, tested by the burner proposed in the bill, is to be 5*s*. 4d. per 1000 from the 1st of July, 1874, to the 1st of July, 1876, the price then to fall to 5*s*.; and if the gas company require relief from this price, they shall, without prejudice to any application to Parliament, seek it by adopting the principles and procedure of the Gas and Water Facilities Amendment Act, 1873, under an investigation by the Board of Trade. A public examiner to be appointed by the Board of Trade to test the quality; his fee, paid by the company, not to exceed £150 per annum, without penalties. Counsel to settle clauses, and the company to pay £500 in lieu of costs to the citizens committee, and, the corporation and citizens approving, the terms of this arrangement to be embodied in the bill, save No. 4, subject to the approbation of Parliament."—Signed by Messrs. Fitzgerald, Barry, and Watson.

The CHAIRMAN: What is the meaning of the clause, "the corporation and citizens approving?" Is it that they are parties to the agreement?

Mr. RICHARDS: Yes.

The CHAIRMAN: What is No. 4?

Mr. RICHARDS: That is the agreement as to costs—viz., that the company shall pay £500, in lieu of costs, to the citizens committee. An arrangement of that kind is not generally put in a bill.

The CHAIRMAN: Do you get your capital?

Mr. RICHARDS: Yes.

The CHAIRMAN: I do not see any objection to such an agreement. When can you have your clauses ready?

Mr. RICHARDS: By to-morrow.

FRIDAY, MAY 8.

The CHAIRMAN asked if a satisfactory settlement of the clauses had been arrived at.

Mr. RICHARDS replied in the affirmative, and said the parties had settled everything amicably.

Mr. MICHAEL added that the proceedings before their lordships were a mere matter of form.

The CHAIRMAN asked if there was anything material to alter in the preamble?

Mr. RICHARDS: No. The first material alteration is the insertion of a new clause in lieu of clause 10. The clause now ran as follows:—A. From and after the 1st day of July, 1874, the highest charge of the company for gas supplied by them, of the quality of 16 candles, authorized by this Act, and tested by the burner hereinbefore prescribed, shall not exceed the maximum rates following, that is to say:—From and during the two years ending the 1st day of July, 1876, a maximum rate not exceeding 5*s*. 4d. per 1000 cubic feet; from and after the 1st day of July, 1876, and thenceforward, save as hereinafter provided, a maximum rate not exceeding 5*s*. per 1000 cubic feet—provided always that the maximum rate of 5*s*., so authorized to be taken after the 1st day of July, 1876, shall be expressly subject to the provisions hereinafter contained with respect to revision of price of the gas supplied by the company after that date. Clause 10—B. If, at any time after the 1st day of July, 1876, the company, by writing, under their common seal, represent to the Board of Trade that the aforesaid maximum rate of 5*s*. is inadequate or unremunerative, and shall seek relief from such maximum rate, and the substitution, in lieu thereof, of a rate more remunerative and equitable towards the company, the Board of Trade, after an investigation, to the publicly held in Dublin, of the representations so addressed to them by the company, may, if they think fit, authorize the substitution of a higher maximum rate for the aforesaid maximum rate of 5*s*.; and, with respect to any such application by the company to the Board of Trade, the several provisions of the Gas and Water Works Facilities Act, 1870, Amendment Act, 1873, hereinafter referred to as the Act of 1873, as to principles and procedure, and in all other respects shall be observed by, and shall be binding upon, the company and the Board of Trade respectively; provided always that

nothing in the Act of 1873 contained shall in any wise prejudice, restrain, or affect any application which the company may be desirous of making to Parliament." These clauses were assented to.

Mr. RICHARDS: Clause 2—B relates to the appointment of a public gas examiner. From and after the 1st day of July, 1874, the Board of Trade shall appoint, and shall always keep appointed, a competent and impartial person to be a public gas examiner of the gas supplied by the company, and such public gas examiner, hereinafter called "the examiner," shall daily test the illuminating powers of the gas supplied by the company.

This clause was assented to, as also were clauses providing that if the company wilfully fail to comply with any requirements of the Act they shall forfeit any sum, not exceeding £5, which two justices of the peace may adjudge, and any further sum not exceeding £5 for every day during which they wilfully remain in default.

Mr. RICHARDS said the next clauses agreed upon were the following:—"The examiner is required on each day to make and deliver a report of the result of the testings conducted by him on the immediately preceding day, to the corporation and to the company, and the books kept by the examiner, for recording the results of the testings, are to be open at all reasonable times to the inspection of the company, without payment." "The company are not to be subjected to any penalties whatever in consequence of the appointment of the examiner, or any report made by him." "The company, if they think fit, on each occasion of the testing of the gas by the examiner, may be represented by some officer, but such officer shall not interfere with the testing." "The fees or other remuneration of the examiner, not exceeding the sum of £150 per annum, are to be paid by the company."

These clauses were agreed to and added to the bill, as also was a clause fixing the quality of the gas to be supplied by the company at 16-candle power instead of 20.

The CHAIRMAN asked if there was any penalty for the infringement of the provisions relating to the pressure or illuminating power.

Mr. MICHAEL said there was a penalty of £25 for an infringement of those provisions, inflicted by two justices, and recoverable by the local authorities. If the examiner found that the gas supplied was not in accordance with the provisions of the Act, he would be required to report the circumstance, and the penalty could then be recovered. In point of fact there were two series of penalties under the provisions of the bill—one inflicted under the general Acts, and another by an agreement with the corporate authorities.

The preamble of the bill was then agreed to, and the remainder of the clauses having been settled, the chairman was ordered to report the bill to the House.

HOUSE OF COMMONS.

THURSDAY, APRIL 30.

(Before Mr. BATHURST, *Chairman; Mr.* RITCHIE, *Mr. Roman* BASS, *and Mr.* BACKHOUSE.)

WAKEFIELD WATER BILL.

Mr. VENABLES, Q.C., the Hon. GRANVILLE SOMERSET, Q.C., Mr. THOMAS, and Mr. BALFOUR BROWN appeared for the promoters; Mr. DENISON, Q.C., Serjeant SARGOOD, and Mr. ROUND on behalf of the Sheffield Corporation; Mr. DENISON, Q.C., Mr. GARTH, Q.C., and Mr. MICHAEL on behalf of Messrs. Samuel Cox and Co.; Sir MORDAUNT WELLS for the Corporation of Halifax; Mr. LITTLER for the proprietors of the River Don Navigation; Mr. BIDDER, Q.C., on behalf of certain owners of steam-engines and works; and Mr. POPE, Q.C., and Mr. WILKINSON on behalf of millowners on the river Don.

Mr. VENABLES, in opening the case, stated that the Wakefield Water Company had, at the present time, the sole right to supply the town with water, and the source of supply extended already to various out-townships, which, if left to themselves, would be unable to go to the expense of obtaining waterworks for themselves. The object of the bill was to obtain a new source of supply, and further to extend the source. In this application they were supported by the corporation of the town, and, indeed, there was really no local opposition from those towns and places which were included within the area. The promoters might, therefore, be considered to come there representing more than their own interests—they represented, in point of fact, a very large and important population, who were in want of a good supply of water. It was the usual case of the interests of a great population requiring a healthy water supply, and, on the other side, the interests, or supposed interests of those who already have rights in the water, which it was now proposed to abstract. It was necessary, therefore, to assure Parliament of the public necessity for the water, and to show that those whose rights in the water were interfered with would be reasonably compensated for the same. The Wakefield Company was established in 1835, with a capital of £20,000, and that capital had since been increased to £70,000. Their supply of water was originally taken from the river Calder, which had now become so much contaminated as to be unfit for use. There was a large manufacturing population living in the valley of the Calder, and there were many factories and mills, the refuse from which was discharged into the river. The report of the commissioners on river pollution showed that one-fourth of the water to the town of Wakefield was supplied from springs and three-fourths from the river Calder, which, as already stated, was polluted by the sewage of the district. It was proposed to take the new supply from the Little Don, a tributary of the Don, and to make a reservoir capable of storing 1100 millions of gallons, or sufficient to cover 160 days drought, which was the longest drought known for many years, and that was the guide to the necessity for storeage. They would give compensation to the river by the storeage of flood water in the winter. The reservoir, though 700 feet above the sea, would be founded on a rock, and there would be therefore no risk of danger from any want of security. The petitions against the bill were founded chiefly on the apprehension that the interests of the petitioners would be imperilled by the abstraction of the water, but the evidence would show that ample provision was made in the scheme to compensate all those whose interests were entitled to consideration. The people of Sheffield had a large gathering-ground of their own, but now they said that the promoters of the present bill ought to be restricted, because the supply proposed to be taken might be required for the future wants of Sheffield. The Corporation of Doncaster, he remarked, had reached a further anti-climax by alleging damage to the river Don. As to the millowners, the promoters proposed to give them compensation water, and this would amount to 2½ million gallons per day. The result would be that, when there was a flood, the water, instead of being wasted as at present, would be stored, and in a drought there would be more water than ever poured down the stream. There would, therefore, be no loss to the millowners, and lower down the river the navigation would not be interfered with.

The following evidence in support of the bill was then given:—

Mr. *Henry Morgan*, town-clerk of Wakefield, gave a history of the various steps taken by the corporation and the water company with the view of improving the supply of the town. Last year there was a proposal to obtain water by boring, but objections were taken on the ground that the water was too hard, and that the supply would be interfered with by mining operations. This proved to be the fact. The council opposed that bill, and entered into negotiations for the purchase of the works, but the proposals failed. The population of Wakefield at the last census was 28,500, and at present would be about 31,000. The population of the whole basin draining into the Calder was 520,000. The water was often nauseous, and the corporation had frequent complaints of it. [Specimens of the water were produced.] *Witness* added that he attended by the instructions of the corporation, who objected to the supply being taken from the Calder, and who wished to have purer water.

In cross-examination, *witness* said he did not know that they were going into anybody else's watershed.

Re-examined: The inhabitants had a repugnance to the water filtered and unfiltered.

Sir *Lionel Pilkington* stated that he resided four miles north of Wakefield, and possessed property in the neighbourhood. Although his property might be injured by the Longsett reservoir, inasmuch as part of the land would be covered with water, and he might be unable to get the minerals for some years, yet the advantage of the supply of pure water to the district was so great that he was willing to waive his own personal claims. He had been a promoter of a new company for the purpose of obtaining a good supply of water, considering the Calder, from which the supply was at present derived, to be a gigantic sewer. That scheme had been withdrawn, and he now supported this bill, because it would afford the supply he desired.

Mr. *W. S. Stanhope*, M.P., said he was well acquainted with the Calder, and considered it one of the filthiest sewers in England, caused by the drainage into it. He had seen the water after filtration, and it surprised one to see how well it appeared to the eye; but it was impossible to remove the deleterious matter. He was chairman of the Gaol and Lunatic Asylum Committee, and they had endeavoured to get a supply from other sources, but had failed. At the asylum there had been diarrhœa and dysentery, and he was of opinion that the state of health would be better if there was a better water supply. The water supply, in consequence of the coal mining, was gradually getting worse, and he considered that the proposed works would be of immense advantage to the district. They now supplied the prison with water by means of Abysinnian pumps, &c., which they had put down at a cost of about £2000. They did this because they considered the water supplied by the company to be impure.

Mr. *Joseph Sykes*, manager and secretary of the Wakefield Water-Works Company, stated that the company supplied water from the Calder. They had endeavoured to get rid of the impurity of the water, but had not been successful, in the opinion of the inhabitants, or in his own. He gave a *résumé* of the various steps that had been taken by the company to enlarge their powers since their commencement of operations, and to increase their capital. The average dividend for the 36 years the company had been in existence was £4 16s. 10d. For the last two years it was 9 per cent. The number of houses supplied was 6294, exclusive of water for manufacturing purposes. If they had the water and works they could supply about 2 million gallons per day now. They had always done their best to supply the best water they could, but he confessed their efforts had not been satisfactory to the town or to themselves.

Cross-examined: The population within the area of their present parliamentary powers was 31,000. The population they now sought to supply was 120,000, including their own present population. Shortly after the company refused an offer by the corporation for the purchase of their works a new company came into the field, and it was since that company came into the field that the old company began to look out for a new gathering-ground. Both old and new companies found themselves in Parliament, but now the new company had retired. The old company had no communication with the new, but they had expressed their willingness to accept the terms of the corporation. It was in consequence of hearing of the new company that the old consented to accept the terms of the corporation, but the corporation would not buy them. The old company did agree to pay the new £5000 to withdraw, and a cheque had been drawn and paid. The cheque had not yet been returned. It was drawn on the 7th of April.

The CHAIRMAN said the committee would take it that the water from the Calder was impure.

FRIDAY, MAY 1.

The CHAIRMAN said the committee must assume that people were desirous of having good water, and he did not know whether the opponents of the bill contended that the water was good, at present.

Serjeant SARGOOD said they had an opinion that what was got out of the river might not be good.

The CHAIRMAN: We may assume that every town wants good water, and shall not require evidence of that.

Serjeant SARGOOD assented.

Mr. *William Strachan*, F.R.C.S., justice of the peace and chairman of the Wakefield Water Company, stated that at the time he first knew the river it was bright and clear, and abounded with fish. He agreed with the evidence of previous witnesses as to the present state of the river, and as to the water being unfit for drinking. The company had made attempts, and had laid out large sums of money, to purify the water. They made new filter-beds, at a cost of nearly £20,000. At the time when the new company was threatening opposition, the old company thought it worth while to pay all the expenses of the new company up to the time that they settled. Of all the difficulties, they thought that the least. As regarded the feeling of the town, he could not say there had been any public meeting on the subject, but he had not heard of a single objection raised to the proposed source of supply.

In cross-examination, *witness* said some years ago the water company threatened to apply for an injunction to restrain the Wakefield Corporation from draining into the Calder. He believed the tributaries of the Calder were equally polluted as the river, because the population was so dense. He believed nearly all the chairmen of local boards of the places proposed to serve were here to give evidence in favour of the bill. Some of them had agreed to take the water, but he could not say they had bound themselves to do so in writing. He did not know anything about the mills on the river Don.

Re-examined: The directors were well aware of the financial responsibility of the scheme, and were prepared to adopt it. They certainly would not have gone into the district if they could have obtained water nearer and cheaper.

Dr. *Crichton Brown*, medical director of the West Riding Asylum, stated that the number of patients in the asylum was 1400, and the number of resident officers 150. The water now supplied was not wholesome. He believed it acted injuriously to health, and that there was no possibility of making it healthy, considering the source from which it was obtained. They had had the water analyzed repeatedly, and the result of every analysis was to show the water to be so contaminated as to be unfit to drink. He had had it examined microscopically, and after leaving it a few days had found a sediment of infusoria and low animal life, showing that the water was in a very putrid state. He had frequently reported to the justices on the effects of water in promoting fever, dysentery, and other diseases. They had had examinations as to the probability of getting water in the neighbourhood, and the result of all these inquiries had been to satisfy him that it could not be done. He had visited the filter-beds of the company, and seen them. The effect of filtration was truly marvellous, considering the state in which the water went in; but he did not think it was efficient or satisfactory. He quite believed the company had done everything possible, considering the state of the Calder, to purify it. The officials of the water company had attended promptly on all occasions when he had had occasion to appeal to them. The death-rate of Wakefield was about 25 per 1000. That appeared to him as being decidedly excessive, considering the salubrious situation of Wakefield and the character of the occupations. The death-rate of London was 22 per 1000. He ascribed that in some degree to the water, but there were other causes at work. He thought the results of any epidemic of cholera visiting that district might be something terrific if the water supply was unchanged. He had looked over

the proposed scheme, and thought it satisfactory. It would give a degree of security from fevers, which the town did not at present possess.

Dr. *Kendell*, one of the West Riding justices, gave corroborative evidence.

Mr. *Marsden*, solicitor to the justices of the West Riding, said he resided at Walton, and gave his testimony as to the great necessity for a better supply of water to that village.

Mr. *Eden*, auctioneer and valuer, Sheffield, said he was well acquainted with the value of the property in and about Sheffield, and had valued the routes along the Don Valley and its tributaries. The water of that river was taken up by the Sheffield Water Company for the purpose of their undertaking, and they furnished compensation according to their Acts. He believed the value of the river mills was increased by the compensation over and above the natural supply, and that they would fetch more than they would have done before the streams were taken. He had often to attend sales, and this constant supply he had heard put forward as an inducement to purchasers.

In cross-examination, *witness* said he was not an engineer and surveyor, and could not say if the town of Sheffield would naturally go to the proposed site if they required a further supply of water. He did not know if they proposed to go there in 1867. He was employed by the Sheffield Water Company to make an estimate of the damage done by the flood in 1864. There were sometimes serious floods in Sheffield, and serious damage was done by them.

Mr. *Starkie*, M.P. for the Southern Division of the West Riding, residing at Heath Hall, near Wakefield, gave evidence as to the necessity of a better supply of water being secured.

Mr. *Robert Charles Wilmot*, of Woolley, agent for Mr. Wentworth and Lord Wharncliffe; the Rev. Mr. *Brooke*, rector of Thornhill, and Mr. *Clay*, of Walton, gave evidence as to deficient and impure water supply in the districts around Wakefield.

The CHAIRMAN: Is it contended that these places are well supplied?

Serjeant SARGOOD: They have no regular supply.

The CHAIRMAN: The committee are aware also that there is a danger of decrease through mining operations.

Serjeant SARGOOD: No doubt the question here is, is the bill brought in to assist them, or are they brought in to assist the bill?

The CHAIRMAN: We may take it that the supply of pure water is deficient, and is jeopardized by mining operations.

Mr. *Clay:* The water supply is getting less and less, through mining operations. In the summer months the supply is so bad that the people are obliged to drink beer.

Dr. *Dyson Wood*, medical officer of the sanitary authority; Mr. *Lodge*, colliery proprietor, Darton, and chairman of the local board; Mr. *John Walker*, Holston; Mr. *Charlesworth*, Lofthouse; Mr. *Amos Holt*, East Ardsley; Mr. *W. Wordsworth*, West Ardsley; Mr. *Marshall Nicholson*, Middleton, and Mr. *Pratt*, Whitwood, gave evidence in favour of the bill. Professor *Way* and Professor *Parkland*, who were connected with the Commission on the Pollution of Rivers, stated that the Calder water was totally unfit for drinking purposes, and that the water proposed to be taken was about as good as could be found anywhere in the three kingdoms.

TUESDAY, MAY 5.

Mr. *Thomas Hawksley*, examined by Mr. GRANVILLE SOMERSET.

I have been for more than 40 years an engineer for water-works, and am now engaged in the construction of two very large water-works in the same district as this bill proposes to utilize. The Sheffield Water Company, for whom I am engineer, neither oppose nor promote this bill. I am well acquainted with the Calder Valley, and have been on various occasions consulted with regard to the water supply of Wakefield, Halifax, Huddersfield, and other large towns in the vicinity. The water of the Calder is polluted from its source to its foot. There are in the Calder between 3000 and 4000 sources of pollution, to which has been added the sewage of 450,000 people. It is important to obtain a better supply of water for Wakefield. I was consulted about a scheme for Wakefield last autumn, and I found that a new company had established itself, and had resorted to the valley of the Little Don. I advised the promoters of this bill to have a counter scheme in the same valley, and on a much larger scale. The water-works at Sheffield embrace 22,000 acres, and these, after giving compensation to the springs, are capable of supplying about 800,000 people. The present scheme is an extremely simple one, and has only one reservoir, which is placed at a level of 800 feet. The district in question contains rather over 1100 million gallons of water. It is capable of giving one-third of the available supply for the purposes of compensation, and affording to Wakefield 4½ million gallons per day for the use of 200,000 people. There are already in the locality 120,000 people, so that a supply will be provided by this bill for 80,000 people to meet future contingencies. It is proposed under this scheme to give the millowners, as compensation, one-third of the available produce of the stream. The average waterfall in the Don district is 42 inches. The gross area is 5220 acres, and the net area is 112 acres less, so that the available area is 5108 acres. I am aware that Samuel Cox and Company object to the bill, but I do not know what they mean in their petition by saying that they are mainly dependent for their works on the water of the river Don. Their works are extremely large, but they require only a small quantity of water power, all the rest being steam power. The allegation that the proposed works would obstruct and divert the flow of the river, and render their works valueless, is only the usual assertion of petitioners. The reservoirs are placed where they can best command the district and furnish the quantity of water which the promoters desire to obtain. The statement in the petition of Messrs. Cox and Co. that the reservoirs cannot be safely constructed is simply sensational. What these gentlemen mean by their allegation on that head I do not know, but it shows that they are not very well informed as to the mode adopted by engineers for the construction of reservoirs. All I can say, without bespeaking too much for myself, is that I know very well how to deal with the matter, and I will be responsible for as good a reservoir at Langsett as any in the world. I estimate the total cost of the works at £325,000, and that is quite sufficient. None of the acreage of the Sheffield Water-Works is affected by this bill. So far from the inhabitants of Sheffield being affected by the scheme, they will be positively benefited, inasmuch as they will have a larger quantity of water available in summer for diluting the sewage of the town, and, by the construction of reservoirs at the source of the streams, the floods will be decreased. The floods at Sheffield are at present a perfect nuisance. The population is largely increasing, but, as matters now stand, the people of Sheffield have a service of water capable of supplying 800,000 people. If Sheffield ever attains to that size, it will be more than a century hence; and if the inhabitants want water, then I can show them where to get it. As regards Doncaster, the proposed works are so situated that they will not interfere with the present sources of supply to that town or divert the water from one watershed to another. On the contrary, the proposed works will rid the town of a portion of the floods which at present do so much damage, and provide it with a more abundant supply of pure water than it has at present. The drainage ground of the district is about 470 square miles, and we only propose to take or affect between 8 or 9 miles. It is perfectly manifest that both Sheffield and Doncaster will be benefited by this scheme, because, as I have said, they will have a better supply of water in the summer months, and the floods, which do so much injury, will be diminished. The interests of the Manchester, Sheffield, and Lincolnshire Railway, who petition against the bill, cannot be affected by this scheme.

Cross-examined by Mr. DENISON: The water in the Don district is good as a general rule. There are two places where peat prevails, and where the water is rather brown. The usual reckoning of cost in the construction of water-works is that £4 per head of population will pay. For gravitation the cost varies from 50s. in the most favourable circumstances, to £12 in the most unfavourable. The new company at Wakefield proposed a scheme about one-half the size of the present one, but I do not know how they made their estimates. I know how we have made ours, and that we have provided for a margin. If I remember rightly, their scheme was to cost £120,000. There is a large quantity of sewage poured into the Don, and the floods are doubtless useful for flushing it and other rivers. I have no doubt of the stability of the reservoir at Langsett.

Mr. DENISON: Have you not said on former occasions that you have had many sleepless nights about the construction of reservoirs?

Witness: Doubtless I have.

Mr. DENISON: Have you had any sleepless nights over this reservoir?

Witness: That arises from a different reason. I am aware that everybody in the neighbourhood of Sheffield will have alarms till the stability of the proposed reservoir is proved, and no reservoirs could be constructed without causing such alarms.

By Mr. POPE: We do not intend to make a reservoir on a bed of clay, but on a bed of shale and rock. What we propose as compensation water is the regular quantity. We have given as large a quantity as we can prudently afford, but it does not by any means follow that it is as large as we could possibly afford if our scheme is to be an efficient one. We merely give the millowners what they are entitled to, according to the rule of one-third, adopted by Parliament.

Mr. POPE: Can you carry out any efficient scheme, and give a larger supply of compensation water?

Witness: I decline to answer that, because the question of compensation has yet to come. If we are compelled to give a larger quantity of compensation water than we propose, it will diminish *pro tanto* the quantity of water we would convey to Wakefield. The scheme would be a good one for the purpose for which it is designed, even if the quantity of water were reduced to 3½ million gallons per day for Wakefield.

Re-examined by Mr. VENABLES: The present population of Wakefield is 80,000, but we make provision for a considerable increase. The consumption of water in Sheffield has been considerably reduced, and the efflux of sewage is consequently diminished. We have had 60 men working at Langsett for two days for the purpose of getting information as to the clay and shale on the site of the proposed reservoir there for the guidance of the committee. It is quite possible to construct a reservoir in a hill valley without the risk of bursting. I have never made a reservoir where the circumstances were more favourable than at Langsett. Doubtless, if the reservoir were to burst, it would do an immense deal of injury.

Mr. *Edward Filliter* deposed: I am engineer to the Leeds, Cleveland, and other water-works, and have been for eight years resident engineer to the Wakefield Water-Works. I received instructions in 1871, from the Wakefield authorities, to prepare a scheme for an additional supply of water, as the present supply is insufficient. I examined the district round Wakefield, including the watershed of the river Calder. There is at the Calder no considerable extent of gathering-round, and no good sites for reservoirs. Having satisfied myself that the Calder is insufficient, I recommended that an attempt should be made to procure an additional supply of water within the borough of Wakefield, but the water was objected to on account of its hardness. I again examined the Calder, and came to the same conclusion as I had done formerly. Besides there are towns nearer to the source of supply, whose claims to the Calder cannot be resisted. I have no doubt that the Don is the best available source. I agree with Mr. Hawksley that the reservoir at Langsett can be constructed without risk.

Mr. *John Fowler*, civil engineer, stated that he was well acquainted with the Langsett district, and the conditions were particularly favourable for the construction of a large reservoir. There was no better gathering-ground in the world than the river Don.

WEDNESDAY, MAY 6.

Mr. *Nuttall*, examined by Mr. VENABLES, said he was a civil engineer, residing at Bury, and had prepared the plans for the extension of the Wakefield Water-Works. In the examinations he had conducted in the neighbourhood he had discovered a compact shale at a depth of six or seven feet. He could not, however, say if a compact shale was a good foundation for an embankment, because he had not much experience in that direction.

Cross-examined: The specimen of shale produced was harder than that generally found, but it was not true that it was so friable as to yield to the pressure of the point of an umbrella. He had seen so signs of landslip, and should say it was strong and firm enough for foundations. There had been a slight fall of clay, but not in the neighbourhood of the proposed foundation. He certainly had not observed trees with the roots torn up near the embankment, showing that the slip was recent.

Re-examined: It was only the surface soil that slipped.

Mr. *Jeffcock*, civil and mining engineer, practising at Sheffield, said he was well acquainted with the geology of the district, and had examined the site of the proposed reservoir. Under a layer of rock they found the solid shale. There was no sign of fault. The slip mentioned was mere surface clay, and might have been caused by the river when it ran there. The strata ran very regularly. The surface of the shale would be less solid than that at greater depth; it got more solid as they went down. Shale would disintegrate with weather and frost, but it would not disintegrate in the embankment, where it would be protected from the weather. He had had no experience of constructing reservoirs, and, therefore, could not say whether shale was a good foundation, but all the reservoirs in the neighbourhood were constructed of it.

Cross-examined: The shale never appeared on the surface except in the river bed. There was no evidence of any recent landslip. There could be no fault of any magnitude, because these measures were so regular.

Mr. *Bewick*, civil and mining engineer, of London, and also practising in Northumberland, gave similar evidence, and said that shale would be a good foundation for the embankment, and he had no reason to apprehend any danger from slips.

Professor *Ansted*, F.R.S., of London, said he had had considerable experience in those kinds of works in the Yorkshire valley, and had examined the spot in question. There was nothing to indicate landslips, and, after making geological observations at the spot selected for the proposed embankment, he was able to state that the shale would form an excellent foundation for it.

The CHAIRMAN intimated that he did not think the evidence as to the character of the shale and the geological formation of the district need be multiplied.

Mr. VENABLES said that the other side would call a large number of witnesses, he believed, and that it would be a matter of weight of evidence. He would, however, take it very shortly.

Professor *Binney*, F.R.S. and F.G.S., said he concurred in the evidence which had been given, and considered the ground selected a very eligible site for the proposed reservoir.

Mr. *Dawkins*, F.R.S. and F.G.S., lecturer in geology at Owen's College, Manchester, said he had examined the proposed site, and considered the place selected for the embankment an excellent one. He saw nothing whatever to induce him to fear any danger from the slipping of the embankment.

Mr. *Leslie* said he had had a large experience in water-works, and considered the site a safe and good one. The shale was solid, and capital stuff to put an

embankment upon. He agreed that there was no difficulty in making the embankment, as the site was a very favourable one.

Mr. *James Farrow* said he lived in Lancashire, and was well acquainted with the district. He thought the position of the water-works was an excellent one. He handed in a list of the water-wheels which would be affected by the extension of the water district.

Mr. *James Glaisher*, F.R.S., was called to speak as to the rainfall in the district. He had tested the subject in various ways, and he now handed in a list of the average rainfall in various parts of the district.

Mr. *Hawksley*, recalled, said, in cross-examination, they could shift the reservoir by 300 yards by putting the embankment to a greater height.

The CHAIRMAN asked whether Mr. Hawksley ever knew compensation water to a greater extent than one-third.

Witness stated that the compensation at Sheffield was as much as two-fifths, and he knew a case where it was one-half; but under the later Act it was not more than one-third on 20 inches. That was the case in all the great reservoirs made in years past. There was no recent exception.

By Mr. DENISON: The case of Dewsbury was 20 years ago, and that ruined the Dewsbury Water-Works.

This completed the case for the promoters of the bill.

Mr. DENISON addressed the committee on behalf of the opponents. He said he would first deal with the opposition of Messrs. Fox, as to which there were certain peculiarities which entirely took their case out of the common category. The water they used was to be taken away from them without coming back again, and on a previous occasion, when it was proposed to take water at Langsett, it was Messrs. Fox's opposition that defeated the project. They could appreciate as well as Mr. Hawksley the value of one-third compensation. If they believed that would be beneficial to them, they would not have been at the expense of this opposition. Then why should the promoters come here now and ask for the water which was refused to Sheffield last year, though the rainfall in this district belonged to them if it belonged to anybody? It was true that Wakefield might be badly off for water; but it was not a case where there had arisen a sudden difference since the former scheme was rejected. As in the case of Nottingham last year, the people of Wakefield must look to another quarter for their water. According to Mr. Hawksley's calculations, the Calder Valley contained water enough for 14 millions, or just eight times the present population. Huddersfield and Halifax both took their water out of the valley, and could anybody suppose that there was not enough for all? The streams were foul, but it was only the streams that were foul, it was not the springs, and they had not shown that the water of the springs could not be made available for their use. A former scheme was to get water by pumping, and even now Selby, which was lower down, got its water by pumping. But he was not concerned in that. What he was concerned in was, that the promoters had not made a case to take this water. Was it a scheme for the public good, or was it an engineer's scheme? Mr. Hawksley had admitted that they would never have come for it but for the opposition of a new company. It was absurd to suppose that the extra population in the villages would require sufficient to repay the cost to the water company. Therefore it was an injudicious scheme on the part of the water company themselves, and he was convinced that if they got the bill they would be in no hurry whatever to make the works. With regard to Messrs. Fox, they were going to prove that taking away one-half of their supply, giving them back one-third, would very seriously damage them commercially. At present they had the means of controlling the water in whatever way they pleased without consulting the millowners, or having anything to do with the water company, with whom they wished to have nothing to do. Reverting to the bursting of the Holmfirth and Bradfield reservoirs, he admitted there must be a risk, and that the risk must be encountered where a reservoir is necessary; but here he denied that it was necessary. What reason was there that Messrs. Fox, who had made the town of Sheffield, should be deprived of their supply, and their works placed in jeopardy by the proximity of the reservoir? Something had been said as to buying up Messrs. Fox's works. As to that, he need only say that the water company had not capital enough for the purpose. Where had there been a case of people going for water into another valley, and invading other people's rights? There was only the case of Dewsbury, which came into this valley, and which, as Mr. Hawksley said, was ruined by it. He did not care whether Wakefield was to be ruined by it; all he hoped was that Messrs. Fox would not be ruined. They were told they would be better off with one-third than with their present supply; but, as a matter of fact, they preferred to be left alone and to remain as they were. On two occasions when Mr. Hawksley had endeavoured to get the water out of this district he was defeated, on one occasion by Messrs. Fox, and on another occasion by other parties to whom he would refer after the evidence on this part of the case.

Mr. *James Halliday*, examined by Mr, GARTH, said he was one of the directors of Fox and Co., Limited. The works were first in the hands of Mr. Fox himself, but in 1871 they passed into the hands of a company. They employed 1300 hands in the works and collieries, and last year they turned over 30,000 tons, and had 15,500 tons of manufactures sent from the works to the railway station. There was in the mines a large quantity of coal and fire-clay. The cost of the works, exclusive of stock and loose tools, would be £220,000, and adding £85,000 for stock and loose tools, the cost would be about £300,000. There had been a considerable depreciation in the shares of the company within the last few days, in consequence, as the directors believed, of the promotion of this bill. The works covered 10 acres, and they had about 200 acres lying around, from under which they get the minerals.

Cross-examined: He could not say that the fall in the price of iron would account for the fall in the price of shares, though they had not got the same price for manufactured iron since that fall took place. Nor did he think the fall was due to the proposed extension of works, because that was done with a view to further profit.

By the COMMITTEE: The millowners must have known long ago that this bill was proposed, but it might not have been so generally known to the public until within the last few days.

Mr. *Samuel Fox*, chairman and managing director of the company, said that he carried on the works himself for 30 years, and they had much increased in extent. They had now 72 steam-engines in the works, and they had ordered a new water-wheel of 40-horse power. Besides that the water was used largely for manufacturing purposes and for washing the slag. For the purpose of carrying on the Bessemer process it was necessary to carry on the works day and night. The rolling-mills had also to be carried on night and day. In the event of a flood from the bursting of this reservoir 150 men working in the low seam of the mine would inevitably be drowned. Within the last few years large additions had been made to the works, and they were contemplating still further extensions. They could not carry on their works very well without the water. They would have to give up their water-wheel. The old water-wheel had been taken out a little time. It had been used for wire-drawing and rolling. The water-wheel and the machinery necessary for working it would cost about £3000. He had opposed two schemes for erecting a reservoir at this place. At that time he had the site of the proposed reservoir examined by an eminent practical geologist, and he reported upon it.

Cross-examined: He did not remember whether it was contended that Sheffield had water enough without this. He believed they had not at that time. The whole of the steam power in the works was 3000 horse, and that of the water-wheel 40. The water-wheel was not used in dry seasons, but it was worked for six months night and day. No doubt in dry times they would get more in compensation water than the water they got now, but there would only be enough to feed the engines, and none for the water-wheel.

THURSDAY, MAY 7.

Mr. *Bramwell*, examined by Mr. GARTH, stated that he was president of the Institute of Mechanical Engineers. He had looked over Messrs. Fox's works. The engine power was about 3000 horse. If all the engines were fitted with condensers there would be required about 7½ cubic feet per second during the hours water was supposed to be given by the bill. That would make 2½ million gallons, irrespective of the water-wheel. The diameter of that wheel was 20 feet, and there would be a fall of 17 feet 6 inches. That would require 18 million gallons for the 24 hours to develop about 41-horse power.

Mr. *Frederick Fowler*, C.E., Sheffield, said that he had prepared a plan of the Stocksbridge works of Messrs. Fox and Co. These works had for many years been increasing rapidly, and were now more valuable than the other works on the Little Don and on the Don as far as Sheffield. He agreed with Mr. Bramwell that the Stocksbridge works required the whole of the water of the Little Don, and that there was no other source of supply. If any accident happened to the reservoir much the same would occur as at Sheffield, and the Stocksbridge works would be entirely destroyed. No doubt the miners would be drowned out, and about twenty cottages would be swept away.

The CHAIRMAN: The committee may take it that it is conceded on the other side that considerable damage would be done if the reservoir burst.

Mr. *Hawksley*: Certainly, if the reservoir burst considerable damage would be done to Messrs. Fox's works.

Witness: The amount of compensation paid for the damage done at Sheffield by the bursting of the Bradfield reservoir was between £300,000 and £400,000. Messrs. Fox's storeage was about 10 million gallons.

Mr. *Green*, examined by Mr. GARTH, said he had for 14 years been engaged on the Government geological survey, and had made surveys of the millstone grit of Derbyshire, and was well acquainted with that particular locality. He was directed by Mr. Fox, in 1867, to examine the proposed site of the reservoir, and he had now occupied four days on the ground in making a careful and detailed examination of the whole site. He had seen the cutting and boring that was going on.

Mr. GARTH: Will you tell the committee whether you consider the site of the proposed reservoir a safe one?

Witness: I look upon it as decidedly unsafe. My examination of the geological construction of the valley led me to believe that it is a place where landslips are likely to occur; and when I looked more closely, I found landslips had occurred to a considerable extent. We found a landslip of four or five acres in extent. There were great blocks of rock, one on the top of the other, the interstices gummed up with clay and loose ground. Large bodies of rock have been detached from the sides of the valley and have toppled down, and have left a large cavity like a quarry, out of which the slip has come. The fall was composed of a mixture of rock, shale, and grit. Smaller landslips have been seen elsewhere. The site of the proposed embankment is across where the slip is.

Mr. GARTH: Will you state whether the peculiar formation of the valley is likely to give rise to those landslips?

Witness: There is a bed there of porous grit stone, and under that beds of shale. This grit is resting on an inclined plane, and if it is loosed it will begin to slide, and it would have that tendency, only that it is prevented by a certain amount of friction between the grit and the shale. The shale is particularly impervious to water. The water would sink through the grit and stone, and in flowing along would make that shale soft and slippery. The millstone is so delicately balanced that the least interference might possibly set it going. There were fissures in the rock two feet wide.

The CHAIRMAN: You are talking of the grit, and not the shale?

Witness: Yes. He added that he had seen a mass of 8000 tons brought down by exactly the same kind of process.

Cross-examined by Mr. SOMERSET: He had known a landslip under similar conditions on the Huddersfield and Milford Railway. A warning was given, and was disregarded, and no sooner did they interfere with the equilibrium than the grit came down.

The CHAIRMAN remarked that here there would be a puddled trench, and there would not be any opening, as in a railway cutting.

Mr. G. SOMERSET: Are you aware of the number of tons we shall require for our embankment?

Witness: Yes; I know you will require a very large quantity.

Mr. G. SOMERSET: Much more than the 8000 tons you spoke of?

Witness: Yes. I know the embankment goes across the valley.

Mr. VENABLES: You have never seen cracks in the shale?

Witness: No.

Mr. VENABLES: If the gritstone was removed there would be no cracks?

Witness said that would be the case if the grit could be removed all the way up to the top of the hill, or until level strata were reached.

The CHAIRMAN: The committee are aware of the difference between a railway cutting and an enbankment with the side of it filled up with clay.

Professor *Hull*, professor of geology at the Royal College of Science, Dublin, agreed with the former witness as to the danger of the proposed site. He was familiar with the subject of the water supply of towns from wells in the new red sandstone. He strongly objected to the present scheme, because it interfered with the natural system of supply, which he believed should be derived from the area in which the town exists. He thought there was risk and danger to the embankment; and he did not think it was the best and cheapest scheme for the supply of Wakefield with water. There was danger of landslip from atmospheric action by rains, frost, and snows. At present he considered the mass above the valley to be in a state of unstable equilibrium.

Cross-examined by Mr. VENABLES: If the reservoir had been proved to be a good one, he could still object on other grounds; he did not attribute much risk to the landslip above the embankment.

Mr. VENABLES: Did you ever know a case of slipping on a gradient of one in ten?

Witness: I cannot answer that question.

Mr. VENABLES: But there is a great slope of one in ten?

Witness: The slipping would be brought about by undermining the cliff. If there was a fissure running up the valley, the puddle wall would not prevent the water percolating through.

Mr. VENABLES: Have you observed any fissure?

Witness: No.

Mr. VENABLES: Did you communicate any information as to the millstone grit to those who consulted you?

Witness: I cannot say that I did. I first looked at the site at the latter end of last month.

Cross-examination continued: He could not say when the last great landslip had occurred. The trees on it might be 20 or 30 years old. He could not say that the slip was not 100 years old. He had heard the evidence of the engineers on the other side. He did not think they saw the source of danger.

Mr. VENABLES complained that this evidence had not been alluded to until after Mr. Hawksley was examined.

Re-examined: The trees might have been on the land before it slipped.

Mr. *Homersham*, C.E., stated that he had been occupied some years in investigations on the water supply of towns. He was well acquainted with the watershed of the Little Don. There was a very large area of the new red sandstone available for the supply of water to Wakefield. Water was obtained from

the red sandstone by means of boring. In that way there was no risk of collision with millowners. There was no need for compensation, and the water was much more wholesome. Messrs. Fox required a million and a half gallons a day for their purposes.

Cross-examined: There were at present 27 million gallons a day. He did not believe that the compensation given in dry weather, or in an average season, would be more than could be got from the natural river. In very dry seasons the compensation might be useful. The actual rainfall of the district for three years was 50 inches per annum. The Manchester area and the proposed area touched each other for about a mile, and were of a similar character, but he should say there would be more water in this district, because of the direction of the millstone grit.

FRIDAY, MAY 8.

Mr. *Homersham* recalled, and further cross-examined by Mr. VENABLES with regard to the difference in the rainfall of the various districts under consideration. The explanation of the large difference shown in the table of rainfall was that the average was taken in some cases for a considerably longer period than in others. The rainfall of 25 inches in the Penistone district was taken from an average of 19 years, whilst that of Coalcoats, amounting to 44 inches, extended over 30 years.

Mr. VENABLES: These, then, you say, cannot be fairly compared?

Witness: No; I think they cannot, as they represent the average of a different number of years. There was also the peculiarity of the district to be taken into account, for where the country was broken by hills and rising ground, the effect was that the rainfall was received in nearly a horizontal direction when the wind was in certain quarters.

Mr. VENABLES: Now, I see in the figures for the year 1867 there is a difference of 18 inches in the quantity of rainfall at the railway station gauge and the reservoir gauge. How do you account for that in gauges only one mile apart?

Witness: I do not think there is any inconsistency in those returns, considering the unevenness of the ground in the locality.

Serjeant SARGOOD then addressed the committee on behalf of his clients, the Corporation of Sheffield, who appeared on petition against the bill. He observed it might be taken as an admission on the part of the promoters that in introducing this measure they were coming out of their own district for a water supply, and invading that of the Sheffield people, who looked with the greatest fear on the threatened abstraction of water from the streams which contributed to the waterflow of the Don. The evidence that had been adduced with regard to the alleged bad quality of the water in the Calder district for Wakefield, was, he must contend, weak, and the fact that they could get a supply cheaper from the Little Don and its tributaries, was not a sufficient excuse for the promoters coming and depriving Sheffield of its natural drainage area. It was really nothing more than the pressure of competition which had made them come to Parliament, and in proof of this statement he need only refer the committee to the facts connected with the introduction of the bill, and the eagerness of the Wakefield Water Company to accept the terms for the transfer of their undertaking to the corporation—terms previously rejected—as soon as they saw another company started. The special grievances of the Sheffield people were that the flood water necessary for cleansing the river bed of the town drainage was to be abstracted, and that the natural district to which they would be entitled to go for an increased watershed was to be invaded by foreigners. The scheme, as regarded the return of compensation water to the river, was devised rather for the benefit of the millowners of the district than for the good of the town of Sheffield; and he need not remark that in returning compensation water, instead of abstracted flood water, the promoters were giving a very different article to that taken away.

The following evidence was then called:—

Mr. *Leather* said he had practised in Leeds for many years as a civil engineer, and had had a great deal of experience with regard to water-works and reservoir construction. He was called in to consult as to the rival scheme which the promoters proposed to bring out after the purchase had been determined upon. They were really coming into the watershed of the Sheffield district. He was of opinion that the supply from the Calder was equally serviceable and accessible for the purposes of the Wakefield water supply as that from the Little Don. The channel bed of the river between the points of the abstraction and return of water was at some times absolutely dry. About 31,000 acres of drainage area would be invaded by the promoters for the supply of Dewsbury, Barnsley, and Wakefield, and this would be deducted from the watershed of Sheffield, the area of which was about 65,000 acres.

In cross-examination, *witness* admitted that he had given his advice to the promoters in favour of the purchase of the scheme under consideration, knowing at the time that great injury must result to the interests of the town of Sheffield by the abstraction of water from the Don, but he explained that he was only called in when it was too late to give contrary advice. There were five or six mills within the borough of Sheffield worked by water power. In some parts the bed of the river was quite dry and stagnant at times.

Mr. *Foster* said he was a civil and hydraulic engineer, practising in Manchester, and had had many years experience. In his opinion the Calder district was quite available for the supply of the Wakefield people's requirements. He confirmed generally the statements of the previous witness.

Mr. *Isaac Booth*, C.E., of Halifax, said he had been for many years engaged in water-works construction. He believed that the promotors could obtain the requisite supply from the Calder, and that the abstraction of water from the Don would tend to injure the interests of the people of Sheffield.

Mr. *J. Hallam*, mayor of Sheffield, corroborated previous evidence as to the present state of the river, and added that he looked upon the abstraction of water, as proposed, as a very serious sanitary question. That was the general feeling of the inhabitants, and a public meeting had been called to sanction the opposition of the corporation to the scheme.

Sir MORDAUNT WELLS then addressed the committee on behalf of the Doncaster Corporation. He said the committee had heard the grievances alleged by the people of Sheffield, and he submitted the Doncaster people had also cause of greater complaint in consequence of the abstraction of water from their drainage area. He believed it was a fact that Doncaster was the only one of the large towns in that district which had made arrangements for the utilization of sewage, and it was therefore highly important that their watershed should not be interfered with, more especially when a large population in the district between Sheffield and Doncaster remained unserved, and these people had a right to seek a supply from the drainage area of the Don.

Mr. *Shirley*, town-clerk to the Doncaster Corporation, said that according to the bill introduced into Parliament last year the promoters had power to take water from the river Don, and that this power was not taken away by any clause in the present bill. The people of Doncaster viewed this bill with feelings of dismay, as it would deprive them of the pure water supply to which they were naturally entitled.

Other evidence was adduced, in which it was stated that there were many corn-mills in Doncaster worked by water power, and the water was pumped into the town by water power. The population of the borough of Doncaster was 18,768, and was rapidly increasing.

Some further evidence having been taken,

Mr. BIDDER opened the case for the Sheffield millowners. He said he represented some 32 millers about the town of Sheffield, the rental of which was £34,500, and at which over 5000 men were employed. Besides the signatories to the petition on which he appeared, there were a vast number of interests similarly affected by the scheme under consideration. There were in Sheffield nearly 100 steam mills, employing 21,000 men. These mills would be seriously inconvenienced by the project submitted. The compensation proposed to be returned in lieu of the abstracted water would not be at all commensurate with the requirements of the mills, and would never have the same vigorous flow of the natural flood.

MONDAY, MAY 11.

Mr. *Robertson*, examined by Mr. BIDDER, said he was a surveyor, and assistant to Messrs. Fowler and Co. He had examined the plans prepared by the promoters of this bill. The petitioners represented before the committee were the owners of 24 mills. The total number of mills in Sheffield was 99, employing about 22,000 persons, and 590 engines of a total nominal horse power of 16,300. The steam-mill interest in Sheffield was a very large one indeed, and anything that would interfere with their power of working would be of serious consequence. These mills were wholly dependent on the river for their water supply.

Cross-examined by Mr. G. SOMERSET: He had not informed himself of the effect of this bill in doubling the natural interflow in the dry weather. There were 32 petitioners out of the 99.

Mr. *James Willis Dixon*, of the firm of Dixon and Son, silver-plate manufacturers, Sheffield, said he had been a member of that firm for something like 40 years. They employed 670 workpeople, and the works were entirely dependent on steam for their motive power. They employed two engines. They were supplied with water from the river, and it would be a serious thing for them if that were interfered with. The floods exercised a beneficial influence in clearing the river bed. If the floods were taken for the purpose of compensation, there would be great danger of the occurrence of pestilence. His works had suffered from the Dale Dyke explosion.

Mr. LITTLER then called the following evidence in support of the opposition of the Don Navigation Company.

Mr. *Sacre* deposed that he, as the engineer, had had the management of the navigation since 1861. He described the route from Rotherham to Keighley, and the branch at Barnsley was the water communication from Sheffield to the eastern districts, including Hull and Grimsby. The traffic was a growing one, and was now over a million tons annually. There was also a great mineral traffic. As to the present water supply, they were greatly short, and had to have recourse to dredging. At Thribergh, four miles above Doncaster, vessels frequently stuck for 24 hours. The water supply was getting less and less every year. Compensation water would not meet their case at all. It would come down in such small quantities that it would practically do no good. They required the floods to cleanse the navigation, and make it wholesome. More silting took place now than formerly. The high ground from which it was proposed to take was of infinitely more importance to them than the same amount of low ground would be. The present state of the river was very foul indeed, and every drop of fresh water would be of importance.

Cross-examined: There were fewer floods now than formerly. The navigation commenced at Jordan, about three miles from Sheffield, with which town they communicated by canal and locks. His company had opposed the Sheffield Water Bill. They got more than a third compensation in that bill. There were two pumping-engines on the canal. They pumped less now than they formerly did. They supplied water to 12 mills, beginning just below Sheffield, and going down to Rotherham. He could not say that they were obliged to do it, but he did not think they could discontinue it. Nearly the whole of the water is put back into the river after being used by the millowners. This water would be taken into another valley, and they would see no more of it. There was no pretence for saying that the Sheffield companies were opposed to this navigation.

Mr. *F. S. Foljambe*, M.P. for East Retford, said he owned considerable property and a mansion on the river Don. He had had a sad experience of the want of water. The river used to supply the house with water; now it was quite impossible to use it. There was often a stench in the neighbourhood of the river that was almost unbearable. He had ceased to reside at the mansion. The river gradually got worse and worse with the increase of population.

Mr. *Charles Bartholomew* stated that until the transfer of the Don navigation to another company he was the engineer of the Don. When he first knew the Don it was only a 4-foot navigation. From time to time the river had been deepened, and they had been enabled to reduce their rates, and these were now as low as any in the kingdom. The quantity of water now came up in less floods than before. This was a matter of very great importance, and if they had no floods the expense and difficulty of keeping the navigation open would be very much increased. The river used to be a comparatively pure stream; but now, in dry seasons, the stench near Rotherham was positively intolerable. The Calder watershed was 10 per cent. greater than that of the Don. This was another reason why the water should not be taken from the latter and put into the former. It would be a loss to Sheffield if the navigation were interrupted. Whereas the navigation could formerly carry only 40 tons, it could now carry 80 tons.

Mr. LITTLER briefly addressed the committee in support of the opposition offered by the owners of the navigation of the Don. The millowners, he said, not only returned the water that was given them, but they supplied a great deal of the traffic to the canal. No compensation could or would satisfy the owners of the navigation, who were entitled to the floods for the purpose of cleansing the river. No case, he urged, had been shown to warrant interference with this traffic.

Mr. WILKINSON then proceeded with the opposition of the millowners of the Don.

Mr. *Alfred Wilson*, engineer, stated that he lived near Sheffield, and had had 17 years experience in business on his own account.

In reply to an objection raised by Mr. G. SOMERSET,

The CHAIRMAN said they could not go into the case of the millowners of the Little Don.

Witness said that if all the mills worked to their full power they would require more water than could be got from the river. The water required for steam would be in addition to that. In his judgment the present scheme would very much prejudice the interests of the millowners, and some of them would be wholly destroyed. He was also of opinion that it would very much prejudice the interests of the town. The compensation proposed to be given would not at all compensate for the freshets that would be taken. More than one-third of the flow of the Don was derived from the Little Don. Having made these examinations, and knowing the country as he did, he thought it would be injurious to the interests of the millowners if this water was abstracted.

Mr. *Jessop*, steel manufacturer at Sheffield, stated that he employed 450 hands at the works on the river Don, but he had other works besides. He knew the district well, and was aware there were many other mills on the river. They had appointed a committee for the purpose of self-defence, and he was chairman of that committee. Independent of the persons actually engaged in working the mills, there were a number of persons who were dependent on the working of the mills for their daily bread. Any interference with the waters of the Don might injuriously affect that population. He considered the waters of the Don essential to the health of the town and for the advantage of the millowners. His mills worked day and night. He had 17 steam-engines, 15 pumps, and one locomotive engine, and besides that he had the water power of the whole of the river which passed through his works.

Mr. *Edward Tozer*, managing director for Saunders and Co., on the river

Don, stated that they had six water-wheels at work, all except one dependent on the river. They had not a sufficient supply. The supply was less than it was before the Sheffield Water Company interfered with them. If this bill was passed the supply would be still less, and that would be very prejudicial to their works. He concurred with the former witness as to the necessity for freshets. In dry weather they suffered inconvenience from the stench. He had considered carefully the scheme proposed by the present bill, and the judgment he had passed upon it was evidenced by his appearance there. The importance of water supply had been much increased by the rise in the price of fuel. They employed 130 hands, and the rateable value of their works was £2110.

Cross-examined: The time had not yet come when the Sheffield Company had to give them full compensation. Practically compensation never placed the millowners in so good a position as they were before. The millowners had stored water for themselves, and found it answer until the river became silted up.

Mr. *Hudson*, millowner on the river Don, stated that he was a member of the Defence Committee. His firm employed about 40 hands in the works on the Don. Besides the water power they employed steam-hammers. They had three water-wheels. He had heard the evidence given by other witnesses, and he concurred with that. He did not think the water given as compensation would be sufficient for mill purposes.

Mr. *Wood*, manufacturer, stated that his works, the Wallsend Steel Works, were stationed above Sheffield. It was in consequence of the water power that he had purchased these works. He had considered the present scheme, and was of opinion that it would seriously damage their works.

Cross-examined: They stored water for work in summer. He had no doubt this scheme would give them a little more in summer, but he should not think that in any case it would do them much good..

Mr. *Charles Atkinson*, ex-mayor of Sheffield, said royalties were paid through him as agent on the quantity of horse power at work on the river Don. The first steam power put down by the side of the river was about 250-horse power in 1859, and it had now increased to 4000. He concurred in the statements of other witnesses as to the damage which would be done by this scheme.

Dr. *Julius Harvey*, medical officer of health for the urban district of Rotherham, was next called.

Mr. VENABLES, for the promoters, objected to this witness on the ground that Rotherham was not in the petition.

The CHAIRMAN ruled that the objection was good unless the evidence related to the case of the millowners.

Mr. *Newton*, C.E., stated that he had examined the site of the proposed reservoir and the watershed, and had inspected the tributaries of the Don to about three miles below Sheffield. He had ascertained by measurement the requirements of every mill. There were 76 wheels in the district he surveyed, giving an average of three wheels to each mill. These wheels could not use the entire flow of the stream, but they used it for about four-fifths of the year, including a considerable portion of flood water. In the Allen Mill, especially, he found they would require 125,000 gallons per minute to work the wheels. They got on an average throughout the year 50,790 gallons per minute. There could be no doubt that there was another and unappropriated district open to Wakefield; in fact, there were three such districts.

The CHAIRMAN, on the objection of Mr. VENABLES, ruled that the committee could not go further into alternative schemes.

In cross-examination, *witness* repeated that there were other districts where water might be taken without doing more harm, but not without constructing reservoirs.

Mr. POPE addressed the committee on behalf of the millowners. If Mr. Hawksley had not satisfied them affirmatively that this was the best possible scheme for the purpose, then they ought not to sanction it. If they were not satisfied of that, the bill must fail on that ground alone. Then came the question—Could the works be constructed with safety? Then—Could the scheme, consistently with its efficiency, give an adequate compensation to those entitled to deal with the streams? It was clear, he argued, that the promoters could not do all they ought to do, and therefore they ought not to have the scheme at all.

TUESDAY, MAY 12.

Mr. VENABLES proceeded this morning to sum up the case for the promoters, and commenced by remarking that as the committee on the previous day had intimated that he need not address them on the geological question, nor on the engineering features of the proposed scheme, he thought he should have no difficulty in satisfying them that the preamble of the bill ought to pass. Having referred to the absolute necessity of providing a new source of water supply for Wakefield, he proceeded to deal with the objections raised to the proposed plan on the ground of the alleged injury the abstraction of the water would cause to Messrs. Fox's works and those of other millowners. He claimed for the promoters that they were arranging to give adequate compensation for the water they took, and contended that so far as Sheffield and other places lower down the Don were concerned they would be greatly improved by the proposed works. Upon the whole, he asserted that the evidence showed the utmost necessity for these new works, and that the proposal was the most eligible that could be submitted to the approval of a parliamentary committee.

The COMMITTEE having consulted for some time,

The CHAIRMAN intimated that, in the opinion of the committee, the preamble was proved; but they thought the clauses relating to the amount of compensation were not sufficient under the circumstances of the case.

Mr. DENISON said the petitioners would now retire from the case, intending to oppose in another place; and he submitted that it would be better to postpone the consideration of the clauses of the bill.

The CHAIRMAN said the committee thought the clauses ought now to be settled.

The clauses were therefore gone through, and the chairman was ordered to report the bill to the House.

Legal Intelligence.

LLANDAFF PETTY SESSIONS.—MONDAY, MAY 4.

(*Before Messrs.* BOOKER *and* HILL.)

ILLEGAL APPROPRIATION OF WATER.

George Milton, of Penhill, was summoned, at the instance of the Cardiff Water-Works Company, for illegally taking water from their pipes on the 21st of April last. Mr. SPENCER appeared to prosecute.

It seemed that the defendant rents some fields at Penhill from Captain Pitman, and on the 21st of April last it was found that a connexion had been made with the company's pipes, for the purpose of supplying cows with water. The water had been used in this way for two years, without the permission or knowledge of the company. The case was pressed on the part of the prosecution, on the ground that they had been deprived of a quantity of water by a mode which it was nearly impossible to detect. The defendant admitted the offence, but urged that it was not done with an unlawful intention. When he took the fields, it was agreed that he should be supplied with water, and he thought that by making a connexion with the company's pipes he should save expense. Mr. Spencer remarked that Captain Pitman was supplied for private use only. Mr. South, the secretary to the company, stated that no agreement had been made with the company for the connexion. He visited the place on the 21st, and found the pipes and water in the field. The case was adjourned for the attendance of Captain Pitman, and at the second hearing the defendant was fined 20s., including costs.

LEEDS POLICE COURT.—TUESDAY, MAY 12.

(*Before Mr.* BRUCE.)

STEALING THE CORPORATION GAS.

Thomas Lindill, plumber, residing at Holdsworth Buildings, New Wortley, was charged with stealing a quantity of gas belonging to the corporation. The TOWN-CLERK prosecuted.

Abraham Lunn, Potter Street, Hunslet, said he was gas inspector for the district in which the defendant resided. On the night of Saturday last he went to the defendant's house along with William Pounder, and found five lights burning. On examining the meter it was found that the ordinary arrangements had been disconnected, and an apparatus was fitted on to enable gas to be burned without being registered. The defendant said he had had very bad gas lately, and he was trying to find out whether it was the fittings which caused it or the meter, so that it should be remedied, and that the trial was taking place when the inspector called.

Mr. BRUCE found the defendant guilty, and sentenced him to two months imprisonment.

Miscellaneous News.

NICTHEROY (BRAZIL) GAS COMPANY, LIMITED.

The Sixth Annual Meeting of the Shareholders was held at the Offices of the Company, Great Winchester Street, London, on Tuesday, May 12—C. PENNELL, Esq., in the chair.

The SECRETARY (Mr. W. Wright) having read the notice of meeting, the following report was presented:—

The directors, in submitting to the shareholders the annexed statement of accounts for the year 1873, are unable to report profitable results on the year's working; the principal cause being unquestionably that which has weighed so heavily upon all gas companies during the past year, viz., the extraordinarily high price of coal; another serious drawback has been the slow progress of the private lighting, the number of houses yet lighted being only 244; the company have also suffered through the sudden death of the late manager, Mr. Pittman, who, during his short administration, managed the works efficiently, and to the satisfaction of the board. Some months necessarily elapsed, after Mr. Pittman's decease in June, before his successor could be appointed; during this time the company's agents in Rio made the best arrangements possible under the circumstances for carrying on the business of the company, by inducing Mr. Ohren, the manager of the Rio Gas Company, to supervise the works until a new manager should arrive out. Mr. A. E. Trewby, who has been selected in the place of Mr. Pittman, was for some time in the service of the Chartered Gas Company of London, and the board have every reason to think he will prove a good manager. It is peculiarly unfortunate that the company should have had to contend with these changes of management during a year when the price of coal was so exorbitant.

The directors regret to have to report a deficiency in the stock of coal, first discovered by Mr. Pittman shortly before his death; on a careful investigation, the actual value of the deficiency was found to be £853 2s. There is little doubt that the quantity short, or the great bulk of it, was never delivered at the works; whether on account of short shipment or of robbery between the ship and the shore, or both, cannot now be accurately ascertained; but due precautions have been taken to prevent the recurrence of such a loss.

Mr. Gotto has only just returned from Rio, where he went on other business, but during a stay of six months he took an active part in looking after the interests of the company.

With regard to the future prospects of the company, the directors are glad to report that the extension of street lamps was completed by the 1st of January last, the total number being now 865, an increase of 365 on the original contract number; further orders are expected for lamps to fill up intervals in various parts of the town on the existing mains. The directors trust that the efforts which are being made to spread the use of gas among the inhabitants will produce a marked effect on that branch of the revenue for the current year.

The city is increasing in prosperity, extent, and commercial importance from various causes; prominently on account of the recent completion of the Nova Fribourgo railway, the terminus of which is now at Barreto, a suburb of Nictheroy, and the tramway having been now extended to that point, whereby the city is brought into direct communication with important producing districts.

To meet the further outlay on capital account, occasioned by the various extensions of the lighting, and to provide working capital, of which the company has for some time been deficient, the directors, in December last, invited applications for £5000 7 per cent. debentures out of £10,000 created, and have allotted £3000 to the present time.

Revenue Account for the Year ending Dec. 31, 1873.

Dr.		*Cr.*	
Coals carbonized	£6,298 15 4	Gas supplied to street lamps	£8,318 12 6
Carbonizing wages	838 18 8	Less fines	72 1 8
Yardmen and labourers	531 10 8		£8,246 10 10
Lamplighters and inspectors	764 16 6	Public buildings	305 0 1
Salaries	938 14 0	Private consumers	2,141 0 10
Agency in Brazil	750 0 0	Residual products	1,295 17 3
Honorarium to concessionaire	250 0 0	Fittings	100 9 7
Maintenance	114 8 7	Transfer fees	3 15 8
Insurance of works	90 0 0	Balance (loss) carried to profit and loss account	18 2 6
Brazilian taxes	67 18 11		
Law expenses in Brazil	55 4 2		
Travelling expenses of manager and foremen	124 11 0		
Directors remuneration	500 0 0		
Office expenses in London and Brazil, including secretary	443 5 0		
General expenses in London and Brazil, including postage and receipt stamps, telegrams, and sundries	174 2 8		
Auditor	15 15 0		
Interest on loans	99 5 1		
Income-tax	11 14 0		
Bad debts in 1873	41 16 2		
	£12,110 15 9		£12,110 15 9

The CHAIRMAN said he was sorry to meet the shareholders with so unfavourable a report of the position of the company, and he felt it the more, inasmuch as when their operations were beginning last year, the directors had hopes that, at the worst, they would be able on this occasion to declare a dividend not less than they had done for the previous year. Circumstances over which they had no control had acted very adversely during the last 12 months upon the profits of this and of every gas company. The enormous increase in the cost of coal had been a most serious matter. Formerly the directors obtained cannel from the Wigan collieries at 21s. a ton, but when the last contract was made there had been an advance to 42s., and shortly afterwards the price rose to upwards of 56s. Under these circumstances, the directors looked around to see if it were possible to obtain coal from some other country than England. No place, however, seemed available but Nova Scotia, and it was not known whether the coals of that country were suitable for the manufacture of gas. The directors, therefore, waited until sundry trials and experiments in North America were completed. The result being favourable, they sent a cargo of this coal to Nictheroy. By the last advices from the manager, it appeared that he had received the coals about six or eight weeks; he had used and proved them, and spoke very favourably about them. He stated that they gave a very fair produce of gas per ton, and that the result in coke, which found a ready sale in Rio Janeiro, was exceedingly good. The price of the coal, delivered on board, was 13s. 6d. per ton. This was the favourable side of the case, but he was bound to

state that the advantages were very much neutralized. In the first place, the freight was much more than from England—probably as much as 10s. per ton more on the average. Another difficulty was that for several months in the year the ports of Nova Scotia were frozen up, and nothing could be exported. This would render it necessary for the company to lay in large stocks of coal during the available season. But the inconvenience of doing so arose from the circumstance that their working capital was small. Besides it was objectionable to hold large stocks of coal in a tropical climate, as it became much deteriorated and less fit for gas-making purposes. The company had sustained considerable losses of coal. Before the discovery as to how those losses were occasioned, the directors had their suspicions that something was wrong, and they wrote to their then manager to ask the cause. Shortly before the death of that gentleman he had ascertained the fact, but could not tell how it arose. A short time ago Mr. Gotto (one of the directors) was at Nictheroy, and while there a cargo of coal came into the bay of Rio Janeiro for the company, and he determined to have the coals weighed. The captain objected, and said it was contrary to the custom of the port; but Mr. Gotto persisted, and, as the result, he found 34 tons of coal deficient in that one cargo. It was impossible that the directors in England could control such a thing as this; but so clearly was it proved in this case that the company had been repaid the cost of the coal and the freight. Some persons had thought that, perhaps, the loss did not always occur in the way of deficient shipments, but that the coal was taken out of the vessels when they left the harbour of Rio. The method in which the coal was sent to the works of this company was by lighters, and it was thought by some that the loss occurred in that way. He (the chairman) was not of that opinion. He thought it was clearly proved that the loss arose through deficient shipments. It would be seen by the accounts that the company had been fined £72 in the course of last year. Perhaps he might congratulate the shareholders that the amount was not larger, especially as he saw by the report of the Bahia Gas Company that they had been fined nearly £400 in six months. The directors had written to the manager on the subject, and had made remonstrances to the authorities, but had not succeeded in getting the fines remitted. They had lately petitioned the Government of the province, setting forth the facts, for at present the testing of the gas by the fiscal was a sort of guess-work, asking to have the fines repaid, and that for the future none should be inflicted unless it was clearly proved that the gas was below the standard prescribed in the concession. They had been much disappointed that the private consumption of gas was so small—it had never reached that which they anticipated at the outset. Latterly an impetus had been given to the traffic of the place, and the commerce had improved. Mercantile men who had resided in Rio were beginning to live more in the suburbs; this, and the completion of the railway, the terminus of which was close to Nictheroy, would help to develop the business of the company. The report had gone so fully into the affairs of the company that he did not know he could add anything, and he would only say he did not see how greater economy could be exercised. He concluded by expressing the hope that next year he should have to congratulate the shareholders upon a greatly improved condition of things.

Mr. GOTTO, in seconding the resolution, said it might be interesting to the shareholders to know that in September last he went to Rio, arriving there in October. The first object he had in view was to examine technically the works of the company, and it was gratifying to him to say that they were then, and during the period of his remaining there, in a very satisfactory condition. Certain economies had been effected by the new manager, Mr. Trewby, the fruits of which would appear during the present year. With regard to the prosperity of the place, he might say that he observed a marked difference in the condition of the houses and the inhabitants from what he observed on his former visit. There was also an increased desire on the part of the inhabitants of Rio to live in the suburbs, and owners of property in the neighbourhood of Nictheroy were obtaining better rents for their property. He was inclined to think that this would have a beneficial effect upon their business. He had made a comparison between the working of this company and that of the Bahia Company, and found that, under all the circumstances in which they had been placed, it was by no means unfavourable. He intended to go to Rio again next month, and he should make a point of giving the closest attention to the condition of the works. Referring to the question of the loss of coals, which had been so very serious, he said he found the greatest difficulty in getting anything like a measurement of coals off the ship's side, but succeeded at last. It happened that on that very ship he had for other works at Rio 347 tons of coal from the same place, and the result of the measurement of that lot of coal was the discovery of a deficiency of no less than 63 tons. That sort of thing readily accounted for the unfortunate losses which had told so seriously against the interest of this company. He had good hope for their future, and he could assure the shareholders that, as far as care and attention on the part of the directors would secure it, they would have nothing to complain of.

A SHAREHOLDER, who said he had been connected with the company from its commencement, complained bitterly of the results of the past working. The company had only paid one dividend of 3 per cent., though this was the sixth annual meeting, and whereas in the original prospectus it was stated that as soon as 500 lamps were obtained the company would be able to pay 10 per cent.; they had now got upwards of 800, and could pay no dividend at all. He objected to the large expenses for "Agency in Brazil," the amount paid to the concessionaire, and to the remuneration of the directors. In his opinion, it would be better at once to wind-up the company, and realize as much as they could by the disposal of the concern.

The CHAIRMAN replied to many of the last speaker's observations. He said that even if it were considered wise to wind up the concern, the relation of the company to the Provisional Government would prevent it being done, but he dissented from the policy of the suggestion. The amount paid to the concessionaire was a matter settled at the formation of the company, and the directors could not alter it; and with reference to the expression of disappointment that having obtained 800 lamps there was no dividend, he stated that the whole of these lamps were not obtained until the beginning of the present year. The chief cause of their disappointment arose from the smallness of the private consumption, and the great increase which had occurred in the price of coal.

The motion was then put and carried.

The retiring director, Mr. Micholls, and the retiring auditor were re-elected, and this closed the business of the meeting.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Shareholders of this Company was held at the Offices, 60, Cornhill, London, on Tuesday, May 12—THOMAS HUGHES, Esq., Q.C., in the chair.

The SECRETARY (Mr. Alfred Lass) read the notice convening the meeting, and the following report and statements of account were then presented:—

The directors have much pleasure in submitting to the shareholders the accounts of the company, for the half year ending the 31st day of December last.

These, with the annexed report of the engineer, show the progress of the company.

The directors have great satisfaction in stating that the net profits for the half year have amounted to £832 17s. 8¾d., and that, after bringing forward the balance from the last account, and paying the dividend to June 30, 1873, together with the interest on loans to the 31st day of December last, there remains an available balance of £851 18s. 11½d., out of which the directors recommend the declaration of a dividend for the six months ending the 31st day of December last, at the rate of £5 per cent. per annum, free of income-tax, leaving a balance of £231 18s. 11½d. to be carried forward to the next half year.

The directors retiring by rotation are Arthur Clarke, Joseph Quick, and Captain Henry Thurburn, who being eligible for re-election, offer themselves accordingly.

The auditor retiring is James Waddell, who being eligible for re-election, offers himself accordingly.

The following is the engineer's report:—

Gentlemen,—The stock returns, statements of accounts, &c., forwarded from here for the half year ending Dec. 31, 1873, will, I trust, be found correct; and also that the working and the progress made for the six months will be considered satisfactory to the directors.

As the works were in course of erection during the corresponding six months of last year, I am unable to compare the working, &c., with the six months ending Dec. 31, 1872.

The Trinidad bitumen has proved a valuable agent in raising the illuminating power of the gas when used in proper proportion with the coal, and carbonized in the same retort. I am glad to say that our stock in hand of bitumen is ample to meet our ordinary requirements for the next twelve months.

For the reason given above, I am unable to compare the gas-rental for the half year with the corresponding half year of 1872, but I am happy to say that the rental is steadily increasing, and I am confident that the current half year will compare most favourably with the six months ending the 30th of June, 1873.

The demand for coke is steadily increasing; tar and sundries realize fair prices.

The additions to capital account have been the laying of a 6-inch main in Robb Street, extending mains in Camp and Croal Streets, and Albert Town district, and the proportionate allowances for new services.

Beyond the ordinary wear and tear expenses, no outlay has been incurred in the retort-house and general works department. The whole of the buildings and plant have been kept in a thorough state of efficiency, and are in first-rate order.

All is working well in the main-laying and distributing departments.

The engineer's bi-monthly reports, and the monthly carbonizing statements, furnish all details in these departments.

The fitters have been fully employed; during the half year, 77 houses and public buildings have been lighted up with 1011 lights, including St. Andrew's Church, Christ Church, the Convent, the Masonic Hall, and the Philharmonic Hall, also 48 additional street lamps, and 7 public lamps in market, being a total for the half year of 1066 lights.

Before concluding this report, I would wish to draw the attention of the directors to the important question of our coal supply.

The directors will be glad to hear that with our present stock, and the "Pelaw Main" coals to arrive by the *Sagitta*, we shall be perfectly safe for the next twelve months, and should the price of coal in England, at any future time, render it imperative for us to look for our supply elsewhere, I think Nova Scotia may be relied on to furnish us with all our requirements at a reasonable rate. The board is aware that a short time ago I purchased some Glace Bay (Nova Scotia) coal, on the quality of which I reported to the directors by the mail of the 26th of January last, and as trade—and particularly the coal trade—is improving daily between this place and Nova Scotia, I have but little doubt that a good gas-making coal will in the future be obtained from Nova Scotia at a fair and reasonable rate.

Dr. *Balance-Sheet, Dec.* 31, 1873. *Cr.*

Share capital—				Fixed plant, mains, and services, as per last account	£27,774	11 1
6200 shares, at £5	£31,000	0 0		Add since expended	936	5 5
Less amounts not called up	3,354	0 0			£28,710	16 6
	£27,646	0 0		Stock in hand	2,943	6 9½
Debenture bonds	3,800	0 0		Cash at bank, and in hand	890	8 8
Retort renewal-fund account	20	19 7		Amounts owing by sundry persons	2,470	13 5
Bills payable	1,396	15 3				
Amounts owing to sundry persons	1,299	11 7				
Profit and loss account—net revenue	851	18 11¼				
	£35,015	5 4¼			£35,015	5 4¼

Revenue Account, Dec. 31, 1873.

Coals and bitumen	£705	12 4	Gas, rental of meters, products, fittings, & sundries	£3,095	14 7¾
Purifying account	22	8 0			
Wages account	491	9 1			
Repairs and maintenance of works and plant, &c.	61	11 5			
Salaries	628	3 4			
Rent, rates, and taxes	52	1 8			
Directors and auditors fees	155	5 0			
Trade and general charges	112	6 10			
Law charges	22	1 10			
Exchanges account	4	17 6			
Bad debts and allowances	6	19 11			
	£2,262	16 11			
Balance, carried to profit and loss—net revenue	832	17 8¾			
	£3,095	14 7¾		£3,095	14 7¾

The CHAIRMAN, in moving the adoption of the report, said there was very little that called for observation, as the business of the company was proceeding steadily and prosperously. There were no means of comparing the last half year with any previous corresponding period, as during the six months ending December, 1872, the works were in course of construction. But, in the engineer's report, shareholders would have seen that, in that gentleman's opinion, the past half year had been one of considerable prosperity for the company; and he also stated very confidently that the current half year would compare very favourably with the first six months of 1873. Shareholders would also see that the net earnings amounted to the sum of £832 17s. 8d., which would enable the directors, if the shareholders accepted their view, to pay a dividend, as recommended in the report, of 5 per cent.—the same rate as paid before—and to carry forward a sum of £231 to the next half-yearly account. It would be remembered that, at the last special meeting, powers were given to the board to raise such sums as were necessary for the completion of the works and for clearing up all current liabilities to that time. That power had been exercised to the extent of £3800. He did not know that there were any other matters to which it was necessary to call the attention of the shareholders, except that he might mention the fact that the progress made during the half year in obtaining new lights had been very satisfactory, 77 houses and public buildings having been fitted with 1011 lights. There had been also 48 additional street and 7 public lamps in the market, so that the total amount of new lights came to 1066. This the directors, watching the progress of the company, and having regard to the estimates upon which it was originally started, believed to be an exceedingly favourable state of things, and showed that the business was likely to be as large and profitable as it was supposed to be when the enterprise was first undertaken.

Mr. H. P. STEPHENSON seconded the motion, and remarked that, to show the progress made by the company, he would just quote one figure. On the 30th of June last, when the company had been about four months established, the private consumption amounted to 101,000 cubic feet, and the gas supplied to the public lamps amounted to 316,000 cubic feet. For the month of January in this year, the private consumption amounted to 258,000 cubic feet, being an increase of 150 per cent. upon the quantity in June, 1873, and the amount of the gas supplied to the public lamps was 418,000 cubic feet, or an increase of nearly 25 per cent. upon the month of June, 1873. These figures showed exactly the progress the company were making, and it would be clearly seen thereby that if the future progress should be as great as in the eight months he had quoted, the shareholders would soon realize all the anticipations formed at the outset as to the results of the company's operations.

The motion was put, and carried unanimously.

The CHAIRMAN then moved the declaration of the dividend recommended in the report, at the rate of 5 per cent. per annum on the paid-up capital of the company, free of income-tax, and payable on the 15th of June next.

Mr. R. KING seconded the motion, which was put and carried.

On the motion of Mr. STOKES, a cordial vote of thanks was given to the chairman and directors, for their attention to the affairs of the company.

The CHAIRMAN, in acknowledging the vote, said it was very gratifying to feel that the company was going on very well, thanks chiefly to the executive committee, of which his friend, Mr. Stephenson, was the efficient chairman; and to the great ability, energy, and accuracy with which Mr. Lass, the secretary, had

taken hold of the business and conducted it. He felt that it was impossible the slightest error could take place on the other side, for it would be instantly pounced upon by the secretary, and not let go of until it had received a full explanation, and this was the only way in which a business conducted at such a distance could expect to be successful. With the two gentlemen he had referred to the company could not be better served, and it would be brought into the most profitable condition that circumstances rendered possible.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

The following is the report made to the Corporation of Dublin on the present state of the works of this company:—

To the Right Hon. the Lord Mayor of Dublin and Town Council.

My Lord and Gentlemen—In accordance with instructions received from Mr. Park Neville, I have done what I could, in the short time that I have had at my disposal, to get the information necessary for enabling me to give you an opinion as to the present state of the gas undertaking, and on the bill now before Parliament for the purchase of the gas-works by the corporation; and also on the bill being promoted by the gas company asking power to lower the illuminating power of the gas supplied to the city of Dublin.

I have read carefully the evidence given in the last session of Parliament by the various witnesses both for and against the bill which was then promoted by the corporation. I have also read the several reports by the engineers as to the value of the undertaking, and I have visited Dublin, and gone over the company's works.

I am very strongly of opinion that the gas supply of all towns ought to be in the hands of the corporations; it is now well understood that competition in the supply of gas ultimately brings increased burdens upon the consumers. Gas is best supplied through a well-regulated monopoly, and in my opinion that monopoly ought to be in the hands of the consumers themselves; but in all cases great care should be taken that too high a price is not paid for the works, as this forms a perpetual burden on the consumers.

In examining the various estimates made by the witnesses above referred to, I cannot but notice the great discrepancy between these estimates and the actual results attained by the company for the six months ending the 31st of December last, as shown by their balance-sheet just issued. On examination it will be seen that the estimates are based on assumption. It is first assumed that 770 million feet of gas are to be sold per annum, but the company never did sell this quantity, and during the six months ending December last only 311,432,000 cubic feet have been sold, equal to 622,864,000 per annum. It is also assumed that 56,000 chaldrons of coke are to be sold at prices variously estimated at from 18s. and upwards per chaldron.

The company have, during the six months above referred to, only sold 13,000 chaldrons, and they have taken credit for 5000 chaldrons in their accounts which were added to stock during the last six months. There are now over 7000 chaldrons lying in the various works, for which there is no demand, at 16s. per chaldron. Then there are also assumptions as to the expenditure; but without going into this, it may be safely stated that had the corporation purchased the works on the terms agreed to last year, they would have found themselves at the end of the first six months in debt to the extent of £26,750, with every prospect of doubling this sum at the end of the next six months.

I do not doubt that better results might have been obtained; but before any great improvement can be expected, a very large sum of money will have to be expended in rearranging the whole works of the company. I have seldom seen a work of any magnitude more unsuitable in its arrangements for the economical production of gas; and whether the works are purchased by the corporation or remain in the possession of the company, this is a matter demanding immediate attention. I do not say that these alterations should be carried out at once, but a definite plan ought to be made out of what is intended, and the alterations carried out from year to year until the whole is completed.

Looking at all the circumstances of the case, the present state of the works, and the financial position of the company, I do not think it would be prudent for the corporation at present to enter into any arrangement for the purchase of the gas undertaking. But I would advise that the attention of the corporation should be concentrated on the opposition to the bill of the company. That the company must get some relief from their present obligations is evident from a survey of the balance-sheet just issued; but every care should be taken that this relief is only temporary, not lasting longer than two years at most; after which the conditions as to supply and price should be the same as they are at present, the company having power to petition the Board of Trade, should they find that they cannot carry on the works under the present conditions. This would place the company in the same position that they would have been in had they applied for relief to the Board of Trade under the provisions of the Gas and Water Facilities Amendment Act of last year.

The powers of the Board of Trade expired on the 15th of February last, and it seems strange that the company did not apply to the Board of Trade under the provisions of that Act before that date, their bill, of course, having been deposited some months previously.

The company, in their bill, give the corporation, or a number of consumers, power to institute proceedings in order to determine the price of gas. This, in my opinion, is not sufficient, but it should be compulsory on the company to have a revision of their quality and price by some competent tribunal at the end of the period above named, or such other period as may be agreed on.

The reduction in quality of from 20 to 16 candles asked for by the company is not, in my opinion, more than is necessary, especially as they intend to use the same test burner, which is at present used for testing 20-candle gas, and which will give practically gas of about 18 candles if tested by the Argand test burner.

The pressure under which the gas should be burned while being tested should not be less than 5-10ths of an inch. In clause 7 of the bill the pressure in the street-mains is fixed at 6-10ths of an inch from midnight to sunset, and 8-10ths of an inch from sunset to midnight. These pressures are, in my opinion, too low for the efficient supply of a large city like Dublin, and should be raised to 10-10ths and 8-10ths respectively.

Power is also sought to raise additional capital. The capital of the company is already very large as compared with other towns, and any increase of capital should be jealously watched. Some expenditure on capital account is, however, necessary in order to put the works in proper order.

Glasgow, April 8, 1874. (Signed) W. FOULIS.

Note.—Since writing the above, I have been informed that the company had arranged for the purchase of coal at 23s. per ton, yielding 20-candle gas, and a coke worth 23s. per chaldron. This does not appear in any of the documents which were given me, nor in the evidence given in favour of the bill before the committee of the House of Lords. The difference in the price of coal would have made a difference in the half year's accounts of £17,400, still leaving a deficiency of £8850. I cannot agree with the statement that any coal yielding 20-candle gas would also yield a coke worth 23s. per chaldron, seeing that a considerable quantity of coke at present in store at the various works (and notably at Kingstown), is coke of excellent quality, made from coking coal, and for which there is little demand at 16s. per chaldron. This difference between the estimates and the actual results of the last six months does not affect the present question further than it shows how unsafe it is to estimate the value of a gas undertaking upon assumed data. The only safe method is to base calculations upon the actual results obtained for a series of years, making such alterations upon these figures as may be considered justly sufficient to meet improvements in manufacture, and in management, and also the facilities which corporations generally possess of being able to finance cheaply.

SALFORD (CORPORATION) GAS SUPPLY.

Increase in Price of Gas.

A Meeting of the Salford Town Council was held on Monday, May 11—the MAYOR (Mr. Harwood) in the chair.

Alderman PLATT moved—"That the price of gas be increased as follows:—To consumers within the borough of 250,000 cubic feet per quarter, 3s. 11d. per 1000 cubic feet. To consumers within the borough below 250,000 cubic feet per quarter, 4s. per 1000 cubic feet. To consumers beyond the borough, and within a radius of five miles from the Regent Road Gas-Works, 4s. 8d. per 1000 cubic feet. To consumers beyond such radius, 5s. per 1000 cubic feet." He said the reason why the Gas Committee came before the council and through him asked for this advance was simply that during the last two years the consumers of gas had been enjoying the use of the gas, which had been produced at a considerably lower rate than would have been the case if the committee had not had very favourable contracts for the supply of coal and cannel—contracts which were made three years ago, and which were now on the point of expiring. It might be asked why they should ask for this advance when the price of cannel and coal appeared to be coming down, but he thought that what he had already said was a sufficient answer. The committee were in hopes that the price of coal and cannel would have come down before it was necessary to enter into fresh contracts, but this had not been the case, and the reason why they entered into contracts a month or two ago was simply because their manager told them that he could not guarantee that the township should be lighted during the ensuing winter if he had not the opportunity of filling his reserve sheds with cannel during the summer months. It was therefore absolutely necessary to enter into such contracts as would enable them to get a sufficient supply of coal and cannel for the production of gas for the next twelve months. The difference in the value of the coal and cannel which they had recently purchased for the next twelve months and that which they had used during the last twelve months amounted to no less than £19,422. 9s. 6d.; but there was a diminution of that amount in consequence of the increased prices which they had been able to obtain for the coke they had produced; and they had also been able to get an increased price for other residual products, which had diminished the cost of coal and cannel for the ensuing year over the last of £15,882 4s. 6d. The net divisible profits made in 1872 amounted to only £5680 15s. 4d., or a very little more than one-third of the difference which they would absolutely have to expend in coal and cannel for the next twelve months; and in the year 1873, principally in consequence of the additional sum received for coke, the divisible profit amounted to £7709 14s. 9d. Therefore, he put it to the council whether it was not absolutely necessary that consumers should pay an additional price for gas. If they did not, it would be necessary for the Gas Committee to trench upon their capital or the borough fund to cover the loss which they must necessarily sustain. The advance proposed did not amount to anything like 8½d. per 1000 cubic feet, and the reason why they did not ask for an advance equivalent to the amount of the difference which he had already mentioned was that they were in hopes that in another year coal and cannel would be reduced to such prices as would enable them to recover in the next twelve months that which they would lose this year.

Alderman TYSOE seconded the resolution.

Mr. DYSON moved the following amendment:—"That the price of gas be increased to all consumers within the borough to 3s. 10d. per 1000 cubic feet; to all consumers beyond the borough, and within a radius of five miles from the Regent Road Gas-Works, to 4s. 8d. per 1000 cubic feet; and to all consumers beyond such radius, to 5s. per 1000 cubic feet." He said he came to the conclusion, after the discussion which took place at the meeting of the Gas Committee, that an advance of 4d. per 1000 cubic feet would enable them to tide over the difficulty.

Mr. NUTTALL seconded the amendment.

Alderman M'KERROW, whilst of opinion that the council had no alternative but to pass the resolution, could not help thinking that the committee had not shown that business tact and discretion which the council had a right to expect. They would find a strong objection on the popular mind to an increase in the price of gas at a time when the price of coal was falling, and he thought they would have done better if they had entered into monthly instead of yearly contracts, in the present state of the coal market.

After some further discussion, the amendment was put and negatived—15 voting for and 22 against it. The original resolution was then put and carried.

CHICHESTER WATER-WORKS.—The first step has been taken towards carrying out the powers obtained in the late Parliament for constructing water-works in Chichester. A contract has been taken for forming a well at Fishbourne, to the west of the city, where there is a fine spring of water, and the first sod has been turned. There are few cities in England where water-works are more required than in Chichester; and it is to be hoped that they will be quickly followed by another equally necessary work—the thorough drainage of the city. We understand that the proposed conversion of the cathedral bell-tower to the purposes of a reservoir has been abandoned.—*Builder.*

ANOTHER FINANCIAL DISASTER.—*Galignani* states that on Tuesday morning, M. Lambquin, Commissary of Police, proceeded to the residence of M. Gauthier, director of the Société des Usines à Gaz Réunies, at 178, Rue Montmartre, and arrested him in virtue of a warrant granted by the law authorities. He then went to the seat of the society, Rue du 4 Septembre, and seized the books and numerous documents, and placed seals on several pieces of furniture. The safe contained a sum of 114,000 frs., obtained from a subscription for the mines of Aunitz, in the Aveyron, which, however, does not really exist. M. Gauthier, aged 55, had been at the head of the company for 10 years, and had also directed the Société du Moteur Lenoir. The charges against him are fictitious subscriptions, and absolute want of capital. Although the amount of the subscribed capital had not been paid up within the time required by the law, he is said to have issued 32,000 bonds for the account of the company. Having managed to get the titles admitted to quotation at the Bourse, he is accused of having put in circulation a larger number than had been announced, and then speculated with the money.—*The Echo.*

HULL WATER SUPPLY.—Great inconvenience and a considerable amount of loss has been occasioned to the inhabitants of Hull this week by the partial stoppage of the supply of water. On Saturday week the bottom valves of one of the engines at Springhead became defective, and only one engine could therefore be worked. The water-works sub-committee met promptly after hearing of the accident, and it was resolved to issue notices that the supply of water for a few days would be only partial, and might even have to be totally suspended. It was also decided that districts should be supplied in turn, and these arrangements have been carried out so as to cause the least possible inconvenience. Most persons in the town had some warning of the intended stoppage of the supply on Saturday night, and prepared themselves accordingly, but some few were unaware of the accident and its consequence, and they were unpleasantly inconvenienced on Sunday. Since Saturday night only one engine has been at work at Springhead, and it is not quite capable of pumping 3 million gallons daily, whereas the average supply to the town of late has been from 4½ million to 5 million gallons daily. At the time of the stoppage of the defective engine the reservoirs at Stoneferry were almost empty, having been recently cleaned out, but the water in them has now been increased to about 5 million gallons. The connexion between the river and the reservoirs has been cleared, in order that a supply of river water may be procured in the event of the remaining engine at the springs breaking down or other casualty occurring. Two engineers have been despatched to London and the colliery districts to procure temporary pumps to assist at the springs whilst the defective valves are being repaired or replaced.—*Hull Paper.*

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the gas consumed in Marylebone during the month of April:—

	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	15·74	17·00	14·41	23·54	8·01	16·57	0·33	No trace
CharteredCompany's common gas	16·24	17·11	15·74	31·10	14·04	15·15	0·53	No trace
CharteredCompany's cannel gas	20·58	21·50	19·78	24·15	12·24	22·17	0·53	No trace

Mean of daily readings of barometer . . . 29·74
" " " thermometer . . . 62·07

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during the month was equal to the light of 15·74 candles; it ranged between 14·41 and 17·00 candles. The mean amount of sulphur found in 100 cubic feet of this gas was 16·57 grains, which shows a considerable reduction in the quantity of this noxious impurity as compared with that of previous months; the amount of ammonia was not more than the third of a grain. The Chartered Company's common gas gave a mean light equal to 16·24 candles; it ranged between 15·74 and 17·11 candles; twice only was it below the legal standard of 16 candles; the mean amount of sulphur was 15·15 grains, and of ammonia half a grain. The mean light of the cannel gas was equal to 20½ candles; it ranged between 19·78 and 21·50 candles; twice only was it below the standard of 20 candles. The amount of sulphur it contained was 22·17 grains, and of ammonia half a grain. The pressure of all the gases was fair, and no trace of sulphuretted hydrogen was detected in either of them by the ordinary tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

ISLINGTON.—At the meeting of the vestry on the 15th inst., the special committee appointed some months ago upon the question of the manufacture of gas by the vestry, and its supply within the boundary of the parish, made a report in which they stated that as the result of their deliberations they had unanimously come to the opinion "that, however desirable it might be for the parish of Islington to make gas for the inhabitants, it is not possible, under the present complicated gas arrangements of the metropolis, for it to do so; but that it is desirable, unless more equitable terms could be made with the gas companies, that application be made to Parliament to place the gas supply of London under one or more local authorities, to be created for that purpose. The complicated gas arrangements above referred to are the statutory powers granted by which the gas companies district the metropolis, the prohibition against any other authority or persons supplying gas, and the fact that there are no existing gas-works which could be purchased by the vestry for the supply of gas within the boundaries of the parish, and also that it would not be possible to purchase any existing gas-works for the manufacture of gas for its own particular district." The report was adopted by the vestry.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone during the month of April:—

	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	April, 1873.	April, 1874.	April, 1873.	April, 1874.		
Distilled Water . . .	0°	0°	0°	0°	0°	0°
West Middlesex water .	19·84	19·52	0·90	0·84	13·14	2·84
Grand Junction water. .	19·96	20·04	0·96	0·92	13·41	2·98

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

The water supplied to the parish by the West Middlesex Water Company was throughout the month clear, bright, and colourless; that supplied by the Grand Junction Company was occasionally somewhat turbid. The returns from the several water companies of the metropolis, show that the daily supply to the entire metropolis was 109,544,116 gallons, the number of houses supplied was 508,818. The average daily supply per head to the entire population was 32½ gallons.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is not much change to note this week in any of the principal trades of Sheffield, or of the adjacent parts of the two counties named above.

The foundries are as a rule doing a fairly good business in general descriptions of castings for colliery, iron-works, and machine purposes, in addition to turning out a good tonnage of pipes. Pig iron for foundry purposes is stiffer in price this week, mainly owing to the restricted production and inevitable confusion in business resulting from the strikes in Staffordshire, Cleveland, and elsewhere. Scotch pig, for the use of founders, is hardly to be had at any price, stocks being low, and the market generally unsettled. Cleveland pig iron is now quoted at about these figures:—No. 1 foundry, 75s.; No. 2 foundry, 72s. 6d.; No. 3 foundry, 67s. 6d.; No. 4 foundry, 65s.; No. 4 forge, grey, 62s. 6d.; No. 5 forge, mottled, 60s.; No. 6 white, 60s.; refined metal, 80s.; cinder, 45s. to 47s. 6d.; and Kentledge, £3 17s. 6d. per ton. These quotations are, of course, nominal in the present state of the labour market. West Yorkshire pig iron is irregular in price, but is in moderately good demand at full rates.

There is a moderately large amount doing in the local steam coal trade, mostly for shipment from Goole, Hull, and Grimsby, so far as South Yorkshire is concerned. From Goole the cargoes are in a considerable proportion coastwise to Lincolnshire, Norfolk, and other seaboard towns, for gas, engine, and household purposes. The tonnage sent from Yorkshire and Derbyshire by rail continues to fall off, as is clearly demonstrated by the returns for last month (April). These show that the Great Northern carried 58,363 tons; the Midland, 112,606; and the Great Eastern, 52,847; besides which the London and North-Western Company took 65,469 tons, much of it from this neighbourhood. To the tonnage of Silkstones, pre-eminently a house coal, I do not need to allude. Of the thick Barnsley coal, twelve leading collieries sent 10,770 tons, as against 15,740 tons in April, 1873. From Derbyshire eight principal pits sent 75,710 tons, of which Clay Cross contributed 22,671, and Langley 19,870 tons.

The question of reducing the miners wages has been settled, so far as the owners are concerned, but is still under the consideration of the miners, who will give their decision to-day (Tuesday). If they resist, a lock-out will ensue.

THE NORTHERN COAL TRADE.

(FROM OUR OWN CORRESPONDENT.)

The gas coal trade remained in a most uncertain condition until Thursday morning last, when, like the reduction of wages, the side issue of a "Baff" Saturday was settled by the men agreeing to work eleven days a fortnight when necessary, and, there being no more disputes to wrangle over, it is hoped that work will have commenced on Monday, and that all the collieries will be kept going tolerably full time. The great strike amongst the Cleveland iron miners will not affect the northern and eastern collieries of Durham, where the principal gas pits are, so much as the southern and western pits. How it may end it is difficult to say, but, if the ironstone men keep out as they threaten to do, there will be plenty of Durham coals in the market in a short time, as 75 per cent. of the coals wrought in the pits of South Durham go to the iron-works. In so uncertain a state of trade there can be no official quotation of prices. Every pit in the county has been doing the best it could for itself during the past ten days, and a good deal of old stock was no doubt wrought off last week. Business in the Northumberland coal-field has been very steady. The collieries, as a rule, have wrought full time, and shipments, upon the whole, at the Northumberland Dock, have been tolerably active. In consequence of the irregularities of the pits in the Durham coal-field, the Northumberland pits have picked up a good deal of business.

During the first two weeks in May, the prevailing winds being from the north-east, there has been a scarcity of coasting tonnage on the Tyne, and somewhat better rates have had to be paid for London, the Channel, and the Irish ports. Last week the men belonging to the principal chemical factories on the Tyne continued on strike against a reduction of wages of 10 per cent. Prices were firmer in consequence; but merchants did not seem to be alarmed lest the strike should continue long. And they were right, for on Friday the men employed by the great firm of Messrs. Hugh Lee, Patterson, and Co., agreed to accept the reduction, and the men belonging to the other principal factories followed. Generally, as regards the Tyne, the trade disputes over the reduction of wages have been settled by a compromise, or by the men agreeing to the masters terms. In the Cleveland iron district the men have revolted against their leaders, who wanted them to compromise the dispute, and down to Saturday they held out. But it is generally thought they will have to follow the trade in other parts of the country, and, in view of a falling market, submit to a reduction. The Miners National Association held its annual conference in Newcastle last week, but, on account of strikes in the coal trade in every part of the country, the proceedings were hurried over, and little business of importance was transacted. The leaders seem to have some trouble to keep their men in hand just now.

Register of New Patents.

2602.—CASPER, E., Finsbury Circus, London, "*Improvements in apparatus for supplying water to steam boilers and other vessels, and in water-purifying apparatus to be used in connexion therewith or otherwise.*" A communication. Provisional protection only obtained. Dated Aug. 1, 1873.

This invention has for its object the construction of apparatus, part of which is designed to maintain a constant and uniform supply of water to the boiler, while the other part removes from the water, before it is admitted to the boiler, all impurities, which if allowed to enter the boiler with the water would produce incrustation.

2603.—SPICE, R. P., Parliament Street, Westminster, and HARTLEY, F. W., Stockwell, Surrey, "*Improvements in carburettors.*" Patent dated Aug. 1, 1873.

This invention has reference to improvements in the construction of vessels or apparatus technically called carburettors, which are employed for impregnating or saturating air or any gas with the vapour of any suitable volatile liquid, the vapour of which is inflammable, and also in the arrangements for their better application to the purposes of carburetting air or gas under certain conditions; and relates to that kind of carburettor in which an external vessel or tank capable of containing the liquor to be vaporized, and of an internal vessel formed with or without a float, and capable of being buoyed up by the liquid or by the pressure of the gas, is employed, the internal vessel being free to rise and fall with the level of the liquid.

The improvements consist in so constructing the internal vessel that the gas or air admitted to the carburettor shall be compelled always to pass and bubble through a column of the liquid, and also through apertures or fine openings in the circumference, bottom, or sides of the internal vessel and above the float when a float is employed.

In order to secure more perfect contact between the air or gas and liquid, it is proposed, when necessary, to form the internal vessel into two or more chambers, so that the gas or air may pass and bubble more than once through the liquid before escaping from the carburettor. In this arrangement the depth of liquid through which the air or gas is to pass or bubble may be varied, and be the greatest in the chamber which the air or gas first enters.

The chambers may be formed in a variety of ways, and may be equal or unequal in area, as circumstances may render expedient, but it is essential that the holes or openings in the internal vessel, through which the gas or air escapes into the liquid, be larger in area in the aggregate than the area of the pipes or channels by which the gas or air is conveyed into or delivered from the carburettor, and the object to be kept in view in any form of construction is the production of a certain bubbling action of the air or gas through a requisite depth of liquid at all times.

The improvements as to the arrangements of the apparatus is as follows:—It is proposed to set two, three, or more carburettors at or about the same level, or one above the other, and support them in or on a stout frame of wood or of iron, or by any other suitable means. Further, the inlet and outlet of each carburettor is to be provided with a valve, and one leading main is to be connected with all the inlet-valves of the carburettors, and another main with all the outlet-valves, so that one, two, three, or more carburettors may be put into action at one time, or shut off in detail as required.

A constant or intermittent automatic supply of the volatile liquid into the carburettor or carburettors may be effected by the agency of a bird-fountain, valve, or any known and suitable method.

2609.—LILLEY, G. C., London Street, London, "*Improvements in cocks or taps.*" Provisional protection only obtained. Dated Aug. 1, 1873.

The object of this invention is to prevent leakage and waste by the cock or tap being left not fully turned off, and for this purpose the plug of the cock or tap is formed conical, and is received into a correspondingly conical seating, and these parts are held together by steam pressure. A spring also acts to bring the plug back to the position for closing when the handle or means of opening is released.

2649.—DOUDS, D., and HARTSUFF, J. H., New Castle, Lawrence, U.S.A., "*Improvements in steam-pumps.*" Patent dated Aug. 7, 1873.

This invention relates to that class of steam-pumps in which the steam is caused to act by direct pressure upon the water, and is directed alternately upon two chambers having a common steam and delivery pipe, controlled by tilting valves in such a manner as to direct the steam alternately upon each chamber, one being filled with water while the other is being emptied. It is well known that in pumps of this class their successful operation depends largely on the rapid condensation of steam in each chamber, after the water has been expelled, to produce a vacuum sufficient to close the steam-valve and cause the water to rush

in and direct the steam into the opposite chamber. When the chambers become heated, however, condensation becomes more difficult, in proportion to the degree of heat. Hence in the operation of pumps of this class much difficulty is experienced, and hot water cannot be pumped.

The invention has for its object to produce a pump free from such defects, and which shall be rapid and effectual in its operation, simple in its construction, easy of repair, and require comparatively little steam; and consists—1. In connecting an air-chamber or reservoir with the suction-pipe of the pump. 2. In the construction of the suction-valves. 3. In the sectional construction of the pump casing, so as to be easily taken apart for inspection and repairs. 4. In the general construction and arrangement of parts of the same.

The upper portion of the pump casing is composed of two tapering chambers, made in one casting, and separated by a partition. These chambers form at their top a wedge-shaped recess, in which a wedge-shaped tilting valve works and closes the entrance to the chamber alternately. The lower portion of the casing is composed of a base containing the suction and discharge valves. The suction-valves rest on inclined seats, having two ports formed therein, which communicate with the suction-pipe. These valves are held in place by casings, and are provided with lugs on their outer sides, which strike against the casings, and prevent the valves from opening too far. The lower portions of these valves are formed with rounded edges, which rest in correspondingly shaped seats in the bottom of the casing. A reservoir or air-chamber is formed in the base between the suction-valves, extending somewhat higher than the two chambers, and the air-chamber or reservoir is provided at its upper part with a plug provided with a spring valve opening downward. The base is bolted to the upper portion in such a manner as to be readily taken apart for inspection and repairs.

2680.—Carey, R., Brixton, "*Improvements in steam-engines and pumps.*" Patent dated Aug. 12, 1873.

This invention relates chiefly to direct-acting steam-pumps, where the piston or plunger of the pump is in a line with the piston-rod of the steam-engine; but the invention is not described apart from the drawings.

2685.—Harcourt, A. G. V., Oxford, and Fison, F. W., Ilkley, Yorks, "*Improvements in the purification of gas, and in the extraction of residual products therefrom.*" Patent dated Aug. 13, 1873.

The objects of this invention are—1. To purify illuminating gas from sulphuretted hydrogen and from ammonia by the application of a mixture of materials which may be dealt with as one substance and used to remove both these impurities without necessitating the employment of separate purifiers or the arrangement of different materials in separate layers. 2. To dispense with washing or scrubbing. 3. To use the same quantity of oxide for any length of time. 4. To obtain sulphur and sulphate of ammonia economically.

To purify gas from sulphuretted hydrogen, hydrated peroxide of iron (hereinafter termed "oxide") is employed, and to purify it from ammonia a solution of persulphate of iron is used, which is prepared from time to time by dissolving a part of the oxide in dilute sulphuric acid. To apply this liquid to the removal of ammonia, it is sprinkled over the oxide during revivification, and before the oxide is replaced in the purifier.

Thus the purifier is charged with a mixture of oxide and persulphate of iron each of which acts independently. The oxide absorbs sulphuretted hydrogen, forming sulphide of iron, water, and sulphur; the last-named substance (formed also during revivification) accumulates, and, after a certain proportion has been reached, must be removed as fast as it is formed. The persulphate of iron absorbs ammonia, forming sulphate of ammonia and oxide. The sulphate of ammonia also accumulates as the process goes on, and must be kept down by the extraction of portions from time to time. The amount of oxide in use remains constant, since all that is removed for conversion into persulphate of iron is restored by the addition of the persulphate of iron thus formed to the contents of the purifier and its reconversion into oxide by the action of ammonia.

The treatment of a part of the purifying material taken out of the bulk of that exposed for revivification, in order to remove and obtain from it sulphur and sulphate of ammonia, and to obtain persulphate of iron, which, in turn, arrests ammonia and is reconverted into oxide, is the distinctive feature of this invention.

The process by which this is effected consists in extracting the material, first with water, which dissolves out the sulphate of ammonia; and next with dilute sulphuric acid, which dissolves the oxide, forming a solution of persulphate of iron. The undissolved residue consists of sulphur. By evaporating the solution of sulphate of ammonia, and by washing and drying the residue of sulphur, these substances are obtained at once in a saleable form.

It is proposed further, as a desirable but not indispensable addition to the processes already described, to convert the ammonia and ammoniacal salts of the liquor from the condensers into sulphate of ammonia (reuniting this portion with the rest of the ammonia formed in the retorts), by heating the liquor by itself, or mixed with lime in a vessel through which a current of gas passes to the purifiers.

2711.—Barber, J., and Ingham, J., Romily, near Stockport, "*An improved method of and apparatus applicable for the manufacture of gas, and other such-like purposes.*" A communication. Provisional protection only obtained. Dated Aug. 15, 1873.

This invention consists in the employment, combination, and use of a steam jet, with a jet of tar, petroleum, oil, or other combustible liquid, so arranged that they can easily be introduced or injected (on a somewhat similar principle to the Giffard injector) into the furnace of a steam-boiler or other place, where combustion takes place, and produces a great heat at a trifling cost.

2713.—Robinson, A. H., Dublin, "*Improvements in water-meters.*" Patent dated Aug. 15, 1873.

According to this invention a cistern is constructed of any given capacity, of glass, metal, or other suitable material, and an inlet-valve or cock is fitted thereto, through which the water or other liquid enters the cistern, such valve or cock being closed by the pressure of the inflowing liquid, or by a spring. The valve-spindle of the inlet-cock carries, in addition to the valve which controls the admission of the liquid, another valve or stopper situate on the outside of the cock, which is acted upon by a moveable valve-seat, or mouth of a moveable outlet-pipe, so as to open the inlet-valve, such moveable valve-seat being actuated by a screw spindle, lever, or otherwise in connexion with the registering or counting mechanism. The valve or mouth of the outlet-pipe in its normal position is open, and admits of the contents of the cistern being withdrawn by opening a cock connected to the outer end, but in order to fill the cistern the mouth or moveable valve-seat on the inner end of the outlet-pipe is raised and closed by coming in contact with the external valve or the inlet-valve spindle by the screw spindle in the act of opening the inlet-valve, thereby preventing liquid from being withdrawn during the time of filling. The screw-spindle which operates the valves is connected with the counting mechanism, and indicates each operation, thereby registering the number of times the cistern or vessel has been filled.

2728.—Smyth, J. F., Belfast, "*Improvements in apparatus for the manufacture of gas, also applicable to the process of manufacturing aërated fluids.*" Patent dated Aug. 18, 1873.

This invention, constituting a self-regulating gas-generator, consists of chambers or portions of a chamber communicating near to the bottom by a slot, pipe, or tube. One chamber is made close, and perforated underneath, or furnished with a second bottom, table, or tray, which is perforated, and is filled with limestone or marble; and the other chamber is filled with hydrochloric acid, which passes through the slot, pipe, or tube, and the perforated bottom, table, or tray, to the limestone or marble, and generates carbonic acid gas.

2729.—Freestone, J. W., Dalston, Middlesex, and Humphris, J., Little Ilford, Essex, "*An improved process and apparatus for treating spent oxide of iron to extract sulphur and ammoniacal salts therefrom, and for purifying these products.*" Patent dated Aug. 18, 1873.

This invention is chiefly designed for treating the spent oxide of iron which has been used in gas-works, and consists—1. In an improved method of bringing the spent oxide of iron or other substance to be treated into contact with a solvent. 2. In a method of separating the solvent from the products extracted from the oxide of iron or other substance, and from the oxide of iron or other substance which has been treated. 3. In the use of oxidizing agents for removing the tar from the solution of sulphur produced by treating spent oxide of iron. 4. In the apparatus for carrying the invention into effect.

2734.—Forster, J. R., Newcastle-upon-Tyne, "*An improved elastic spigot and socket pipe-joint.*" Patent dated Aug. 18, 1873.

The invention consists in the use of an elastic vulcanized india-rubber circular ring, and in the employment of an additional collar and groove cast on the spigot end of the pipe, such collar and groove to be cast, according to the size of the pipe, at such distances from the spigot end as may be required. The external diameter of the ring is made larger than the internal diameter of the socket, and the internal diameter smaller than the spigot; it is therefore stretched on to the end of the spigot into the groove made to receive it, and having been inserted into the end of the socket, is forced home; the ring, being elastic, yields to its position, and becomes oval in shape, pressing tight against the collar and inner surfaces of the pipe, thus forming a perfect joint.

2747.—Turner, R., and Rollason, G. R., Birmingham, "*An improved arrangement for counteracting the weight of pendant sliding chandeliers.*" Patent dated Aug. 20, 1873.

The novelty of this invention consist in the superseding of the usual pendant weights and pulleys as a counterpoise for chandeliers and other pendant gas or other fittings, which is effected by a box or frame spring or springs with the addition of a regulating friction break for adjusting the contracting force of the spring with the weight of the fitting.

2755.—Carter, C., Liverpool, "*Improvements in apparatus for drawing and preventing waste of water from pipes, mains, cisterns, or other sources, for domestic or other purposes, also for water-closets.*" Patent dated Aug. 20, 1873.

This invention relates to that system of supply in which a cistern, vessel, or compartment containing no more water than is required to be delivered or drawn off at one operation is connected to a tank-pipe or other main. At present the cistern of limited supply is made independent of the tank or main, and is found in practice to be exposed to the dangers of breakages and explosions when there is extreme cold, on account of its small capacity; and the object of this invention is to prevent these inconveniences and at the same time to attain economy. The independent cistern has hitherto been placed below or within the tank or main; but is now formed by simply making a partition in the tank or main at such a distance from an end or side, that the cubical contents of the smaller division shall be equal to the quantity of water required to be delivered or drawn off, the two compartments communicating with each other by means of a pipe at the bottom, and as both compartments are only parts of one tank or main, the expansion and contraction of the several parts are equal, and no breakages take place.

2759.—Clark, A. M., Chancery Lane, London, "*Improved apparatus for regulating or controlling the supply of gas or water in buildings.*" A communication. Patent dated Aug. 20, 1873.

This invention relates to a means of regulating or cutting off the supply of gas at the meter from the room where it is used to prevent waste, and it consists in a cock or valve arranged on or near the meter on the gas-pipes attached by a flexible connexion to valve-lifting mechanism placed in the room or apartment where the gas is in use. By this means the supply of gas may be graduated to suit the wants of the consumer, and no surplus is kept under pressure in the pipes to escape through the joints. An arrangement for using the invention in connexion with the water supply of a house is also described.

2779.—Lake, W. R., Southampton Buildings, London, "*Improvements in apparatus for the production of light from benzine, naphtha, and other like substances.*" A communication. Patent dated Aug. 21, 1873.

This invention relates particularly to that class of vapour burners in which is employed a supplementary jet to assist the generation of vapours from the illuminating medium; it also relates to a tank or reservoir to be applied to a lantern frame of a street-lamp, the tank being for the reception and holding of the liquid hydrocarbon to supply the vapour burner.

2781.—Warren, W., Cheltenham, "*Improvements in and applicable to pumps.*" Patent dated Aug. 22, 1873.

This invention relates to improvements on that class of pumps for which letters patent were granted to the present inventor dated the 8th day of December, 1866, No. 3242, the object of the present improvements being to render such pumps self-charging after having been emptied.

To carry out this invention, a cylindrical or other suitably shaped chamber is applied round the feed or suction pipe of the pump, a space being left between the two lengths of pipe in the chamber, and a small hole, or holes, is or are made in the pipe near the bottom of the chamber. Below the chamber the pipe is formed into or with a syphon, or S-shaped bend.

2782.—Brachigny, L. M., and Deschamps, J. E., Rouen, France, "*Improved machinery for obtaining motive power by means of water and air or other fluid.*" Provisional protection only obtained. Dated Aug. 22, 1873.

The essential organs of this mechanism are moveable bellows fixed to a jointed chain circulating like a noria upon two guide-wheels superposed in the interior by a receiver full of water. The bellows are put by special conduits in continuous communication with a taking of the exterior air, so that they can open and become filled with air while rising, whilst the bellows which descend on the other side close and become discharged of air by the effect of the weight of leaden plates which form the bottom of these bellows.

2784.—Wilson, A. F., Buckingham Street, Adelphi, "*Improvements in apparatus for lighting and extinguishing public and other gas lamps or lights.*" Provisional protection only obtained. Dated Aug. 22, 1873.

This invention relates to the lighting and extinguishing of public or other gas lamps or lights automatically, the actuating power being the pressure of the gas itself, and is based upon an invention for which letters patent, No. 2101, dated July 12, 1872, were granted. The general arrangement of the apparatus is very similar to that described in the specification of the invention referred to.

The present improvements, however, refer more particularly to the construction and application of the float attached to the gasholder, and may be described as an annular hollow cup, the annulus being open at the top and closed at the bottom, the centre being open both at top and bottom. This float is made of such size as to hang within the gasholder upon two centre pins, so as to adjust itself to the level of the mercury in the tank, where it is placed with its closed side downwards. At opposite sides within the annular float, and passing through the bottom, are two syphon tubes arranged so that in descending the mercury will pass through them into the float, but on ascending will allow the mercury to flow back again to the tank until the float is nearly empty. The reason for

attaching a float such as described is to obtain a support or sustaining medium for the holder in its descent, corresponding to the air space, which must be immersed under the level of the mercury before the float would begin to fill, and a weight on its ascent to the extent of the height to which the float has to be raised above the level of the mercury before the friction of the tubes will allow the syphon to act. The float is also capable of adjustment by suspending it at various heights to suit the maximum and minimum pressure at which it is desirable that the lamps should be lighted and extinguished.

A modification of this float may be employed by turning it bottom upwards and dispensing with the syphons, when it will act by a mechanical movement on the centre pins, and allow the greater portion of the air to escape in the descent, but on its ascent it will form a weight by its tendency to create a vacuum, which will cause the float to carry up a portion of the mercury above the level of the rest. One or more valves, either hydraulic or with a ground or soft surface seat, would assist this action by more effectually expelling the air. Under some circumstances this modification may be found convenient, but the first-named arrangement is preferred.

Another improvement consists in forming concentric rings or cups on the exterior of the holder, so as to allow of its weight being regulated by shot or sand, which is confined thereto by being covered with a suitable plate. At or near the top the tank is furnished with levelling points, and the bottom, in order to adjust it at a level, is provided with lugs and screws which bear on a plate resting loose on the top of the lamp-column. It is also proposed, in carrying out this invention, to make the pipes connecting the burners to the tank of a bent or curved form in preference to right-angled junctions.

Although the foregoing describes the apparatus as placed on the top of the column, the principal part of the apparatus can be placed within the column at its base, or in any other situation found most convenient or advantageous.

2791.—Goodall, R., Armley, near Leeds, "*Improved means or method of treating and clarifying impure or waste water, sewage, or other impure waters.*' Patent dated Aug 23, 1873.

According to this invention, to the water to be clarified is added fine ashes and slaked lime, and the whole is stirred until the water is "cracked;" then add sesqui-persulphate of iron in solution (obtained from the mother liquor of copperas beds) and saturated solution of sulphate of magnesia or Epsom salts, and the whole is again stirred or agitated, whereon the solid matters and impurities and discolorations are separated and precipitated.

2812.—Lake, W. R., Southampton Buildings, London, "*An improved machine for forming the internal screw-threads of gas-fittings.*" A communication. Patent dated Aug. 26, 1873.

The purpose of this invention is to facilitate the work of tapping or forming the internal screw-threads of gas-fittings, and to perform such work with a uniformity of size, so that any number of fittings can be readily coupled to each other.

The machine has a circular frame mounted on legs. In the upper outer edge is cut a rabbet, in which is fitted a rotating carriage, the face of which is provided with cogs or leaves, whereby it is made to revolve by means of the mitre wheel actuated by a belt and pulley. To the periphery of the carriage, and perpendicular to its plane, is secured a stay, in which are arranged three taps. Two of these taps are horizontal, and the other occupies a vertical position—*i.e.*, at a right angle to the horizontal taps. Each of them is fitted in a mandrel or spindle driven by a mitre pinion secured to the mandrel by means of a groove and feather, so that the mandrel can work backward and forward on the pinion and at the same time be rotated therewith for operating the taps. In the outer end of each mandrel is fitted a feed screw. These are fixed in the studs by a nut and screw head so that they cannot turn, hence the mandrels run upon the screws. The latter work in nuts screwed to the ends of the mandrels. The mitre pinions are actuated by a wheel which is rotated by a pinion meshing in a toothed segment projecting from the side of the frame of the machine, and which is called the induction segment. On the upper side of this frame is secured another toothed segment, which is called the eduction segment, the teeth or leaves being on its under side.

The device for holding the couplings or other gas-fittings while being tapped is a clamp consisting of a pair of jaws. One jaw is rigid, but adjustable for the purpose of adapting it to different sized fittings, whereas the other jaw is moveable toward or away from the rigid jaw, which is made in two sections secured to each other by screws. The moveable jaw is held in the proper relation to the rigid jaw by guide-rods, on which it is made to slide by an arm to which it is attached by a yoke. The arm projects from one end of a shaft, on the opposite end of which is a short arm from which projects a pin into a slot in the end of a slide. From the lower end of the slide extends a stem, around which is coiled a spring. A T-piece coupling or other gas-fitting requiring to be tapped is secured in the clamp with the stem or middle part upward. The position of the coupling when thus held in the clamp will be such as to bring its stem in direct line with the vertical tap and the arms or branches of the cross-piece in direct line with the two horizontal taps, which are fed or forced into the coupling or fitting by the screws, and at the same time they are revolved by the wheel and pinions, the wheel being rotated by the pinion geared with the induction segment.

By the time the carriage has revolved the distance of the segment the taps have been worked into the fitting to the depth required to form the thread therein; a reverse movement to withdraw the taps from the fitting is obtained by the eduction segment. The T-piece or other fitting is now discharged from the clamp by a pin or finger, which is actuated by a cam attached to the side of the frame.

It is preferred to provide each machine with seven sets of three taps, but a greater or less number may be employed, as the size of the machine may require, and each set may consist of more or less than three taps, according to the form or character of the fittings to be tapped by the machine.

APPLICATIONS FOR LETTERS PATENT.

1629.—Kaulbach, E., Bedford Square, London, "An improvement in the means of and apparatus for raising and lowering gaseliers and chandeliers." May 8, 1874.

1652.—Butterworth, E., Manchester, "Improvements in air and gas engines." May 9, 1874.

1670.—Stuart, J. M., Queen Victoria Street, London, "Improvements in gaseliers and in glass shades or globes for gas-burners." A communication. May 11, 1874.

1689.—Alsing, G., Preston, "Improvements in the manufacture of an artificial fuel from sewage deposits, nightsoil, and other dry and moist manurial matters mixed with other materials." May 12, 1874.

1698.—Warner, W. J., South Shields, and Cowan, W., Edinburgh, "Improvements in gas-meters." May 13, 1874.

1709.—Budenberg, A., Manchester, "Improvements in meters for measuring the flow of liquids." A communication. May 14, 1874.

1711.—Beale, J., East Greenwich, Kent, "An improved engine to be used for pumping gases, air, or fluids." May 14, 1874.

1713.—Raines, W. N., Dukinfield, "Improvements in pistons for steam-engines, pumps, and other such applications when packing is required." May 14, 1874.

GRANTS OF PROVISIONAL PROTECTION.

1530.—Brine, G. J., and Allen, T., Southsea, Hants, "Improved cisterns or cistern apparatus for discharging or flushing at intervals, and preventing waste of water." May 1, 1874.

1531.—Gercke, K. L. H., Berlin, "Improvements in apparatus for regulating and measuring the flow of gas or other fluids." May 1, 1874.

1550.—Knowles, Sir F. C., Bart., Lovell's Hill, Berks, "Improved manufacture of gas for heating purposes." May 2, 1874.

1567.—Lowne, R. M., Finchley, Middlesex, "Improvements in anemometers and other fluid meters." May 4, 1874.

1584.—Sugg, W. T., Vincent Works, Westminster, "Improvements in apparatus for regulating the supply of gas." May 5, 1874.

1589.—Lenoir, F., Paris, "Improved apparatus for carburetting gas." May 5, 1874.

1602.—Fisher, D., Pimlico, Middlesex, "Improvements in meters for measuring water and other fluids." May 6, 1874.

NOTICES TO PROCEED.

3.—Lamont, J., Glasgow, "Improvements in the manufacture of illuminating gas, and apparatus or mechanism connected therewith." Jan. 1, 1874.

64.—Benson, M., Southampton Buildings, London, "Improvements in the structure of furnaces and the apparatus connected therewith for manufacturing iron and other metals by the use of hydrocarbon vapour or gas, combined with or without superheated steam for heating purposes." A communication. Jan. 6, 1874.

84.—Brookes, W. H., Birkenhead, "Improvements in pumps." Jan. 7, 1874.

121.—Benson, M., Southampton Buildings, London, "Improvements in pump-valves." A communication. Jan. 9, 1874.

404.—Cherry, H., Handsworth, "Improvements in steam-pumps." Jan. 31, 1874.

1390.—Crawford, A., Glasgow, "Improvements in water-closets, and in waste-preventing water supply apparatus." April 22, 1874.

1391.—Forbes, Rev. G. H., Broughton, Northampton, "Improvements in the utilization of the foul or refuse lime of gas-works." April 22, 1874.

1435.—Lowe, C., and Gill, J., Manchester, "Improvements in the manufacture and separation of certain mixed coal-tar products." April 24, 1874.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3699.—Holman, S., Laurence Pountney Lane, London, "Improvements in direct-acting steam-pumps and pumping-engines, and in condensers and governors therefor." Nov. 13, 1873.

3807.—Ross, W., Glasgow, "Improvements in apparatus for supplying and regulating the quantity of water used in water-closets and other cisterns or vessels." Nov. 22, 1873.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

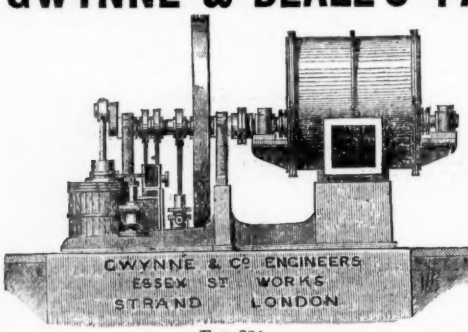


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

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GAS-EXHAUSTING MACHINERY.

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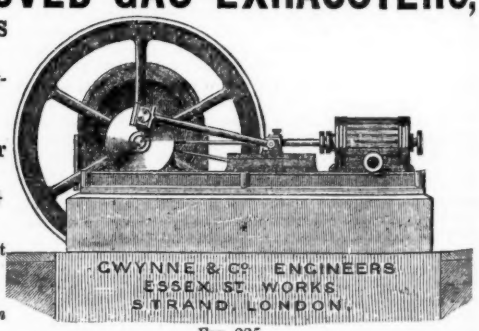

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

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G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

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VINCENT'S
PATENT IMPROVEMENTS
IN
Apparatus for Manufacturing Gas.
Particulars to be obtained by application to—
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For Companies to issue to their gas consumers.
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GAS MANAGER'S HANDBOOK;
CONSISTING OF
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"This edition of a well-known and esteemed Handbook is a considerable improvement, both in form and contents, on the first. The information, which is of the most wide and various kind, is taken from authoritative sources, and altogether this may be fairly described as among the most useful manuals of its class."—*Iron.*
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1862.

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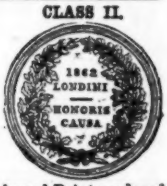

This Paint having been in general use over twelve years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.
It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.
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The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.
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Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;
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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

WANTED, a situation as Gas-Fitter or METER-FIXER. Good references from last situation. No objection to go abroad.
Address, stating wages, E., 155, Brearley Street West, St. George's, BIRMINGHAM.

WANTED, a general out-door Foreman, for a small Gas-Works in the country. Will be required to inspect gas-meters and have the supervision in the Gas-Works. Must be sober, steady, and qualified to reglaze lamps, &c.
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WANTED, by an active and persevering young man, of good experience and unexceptionable references, an appointment as CLERK, or in any position of trust.
Address W. N. P., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an engagement as Manager or MANAGER and SECRETARY of a medium sized Gas-Work. Thoroughly understands the manufacture and distribution of gas, having had many years experience, and can give most excellent testimonials as to character and ability.
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WANTED, a second-hand cast-iron TANK or PURIFIER, to hold about 500 gallons. Size preferred 8 ft. by 4 ft. by 3 ft.
Apply, with dimensions and price, to THOS. H. METHVEN, BURY ST. EDMUND'S.

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WANTED, to Lease a Gas-Work, where the make is not less than 3,000,000 feet per annum.
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WANTED to purchase, 5000 to 10,000 tons of GAS COKE. Waggons can be sent to any station for any proportion of above.
Address G. J. EVESON, Gas Coal and Coke Merchant, STOURBRIDGE.

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THE Advertiser desires an engagement as ASSISTANT ENGINEER or SUPERINTENDENT of a Gas-Work, metropolitan or provincial. Well acquainted with the working. Has held the same position before. Can analyze gas and use the photometer. A fair draughtsman, and can produce drawings and good references.
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ROBUS, SIMPSON, & ROBUS,
(Late of the Crystal Palace District Gas-Works, Sydenham, and the New City Gas-Works, Montreal, Canada,)
GENERAL CONTRACTORS & RETORT-SETTERS, FITTERS & MAIN-LAYERS.
RETORTS SET ON THE LATEST IMPROVED PLAN.
Retort-Setters sent to all parts of Europe and America.
Address, J. and H. ROBUS,
BELL GREEN, CATFORD, KENT

FOR SALE—Gas-Works in Hampshire, with possession on the 30th day of June, 1874.
For particulars, apply to Mr. ALFRED LASS, 60, Cornhill, LONDON, E.C.

FOR SALE, Fourteen paid-up £25 shares in a small Gas Company, to pay 7 per cent. per annum.
Apply to JNO. GODDEN, High Street, GLASTONBURY.

FOR SALE, a second-hand Station- METER, 10,000 feet per hour, with 9-in. bye-pass complete.
JAMES MILNE AND SON, Milton House, EDINBURGH.

CANTERBURY GAS AND WATER COMPANY.

FOR SALE, in consequence of a larger one being required, a STATION-METER, by Parkinson, to pass 6000 cubic feet per hour.
The Meter is in good order, and may be seen at work on application to the Manager.
JAMES BURCH, Secretary.
Canterbury, May 12, 1874.

FOR SALE, and ready for immediate delivery by the Barnstaple Gas Company, about 35 ft. of 12-in. Hydraulic Main, in five lengths; 15 ft. of 16-in. Hydraulic Main; cast-iron Stools for ditto; 21 15-in. Mouthpieces; a number of Ascension-Pipes, Bridges, and Dips; together with a quantity of odd castings suitable for a small work.
Feb. 26, 1874.

TO CONTRACTORS AND GAS ENGINEERS.

TENDERS and Specifications are invited to ENLARGE the Malpas Gas-Works, by erecting a new Gasholder, 30 ft. diameter by 12 ft. high, with tension-rods and balance-weights, the tank to be coped with blue bricks; 2 Purifiers, 4 ft. square, with 4 valves; 8 Double Condensers, with box and 4-in. connecting-pipes all through; a new bench (16 ft. by 9 ft.) of six round Stourbridge Clay Retorts, 8 ft. by 16 in., one, two, and three in a bed respectively, with new mouthpieces, ascension-pipes, and hydraulic. The whole to be set up and ready for work by the end of July.
Tenders to be sent to the CHAIRMAN, Malpas Gas Company, Limited, not later than the 28th of May.
The Directors do not bind themselves to the lowest or any particular tender.

BRITISH
ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING OF MEMBERS.

CIRCULAR OF ARRANGEMENTS.

THE
ELEVENTH ANNUAL GENERAL MEETING
OF THE MEMBERS OF THIS ASSOCIATION WILL BE HELD ON
TUESDAY, WEDNESDAY, & THURSDAY, the 9th, 10th, & 11th of June, 1874,
AT
THE SOCIETY OF ARTS ROOMS,
JOHN STREET, ADELPHI, LONDON.

GEORGE T. LIVESEY, ESQ., MEMB. INST. C.E., PRESIDENT,
Will occupy the Chair.

ORDER OF PROCEEDINGS.

TUESDAY, JUNE 9, 1874.—Morning Meeting.

The Chair to be taken at Eleven o'clock.

Inaugural Address by the President. | Admission of New Members.
Reading of Papers and Communications.

Evening Meeting.

A Lecture will be delivered at the Society of Arts Rooms, by ROBERT ETHERIDGE, Esq., F.G.S., &c., &c., "On the Geology of Coal." The chair will be taken at Half-past Seven o'clock.

WEDNESDAY, JUNE 10, 1874.

The Chair to be taken at Eleven a.m.

Reading of Papers and Communications, and the Transaction of other Business.
Election of Officers for ensuing Year, &c.

At Six p.m. the Members and Friends will dine together at the Terminus Hotel, Cannon Street.
Tickets for the Dinner, 7s. 6d. each, may be had from the Secretary.

THURSDAY, JUNE 11, 1874.

An Excursion by Steamboat to Woolwich to inspect the Royal Arsenal, for which special arrangements have been made with the sanction of the War Department.

LIST OF PAPERS AND COMMUNICATIONS
TO BE SUBMITTED TO THE MEETING.

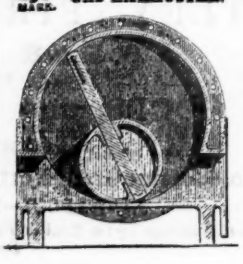
"Vincent's Patent Gratings applied to Gas-Retorts." By Mr. HODGSON JONES, of London.
"Purification." By Mr. GEORGE ANDERSON, of London.
"Condensation and its Effects in the Retention of Naphthaline." By Mr. JAMES WATSON, of the Crystal Palace District Gas-Works, London.
"Desirability of Companies extending their Control to the Point of Consumption." By Mr. ISAAC A. CROOKENDEN, London.
"Meters." By Mr. W. J. WARNER, of South Shields.
"Improved Method and Apparatus for Manufacturing Gas." By Mr. JOHN WEST, of Maidstone.
"Retention of Naphthaline." By Mr. G. D. MALAM, of Halifax.
"Gasholders." By Mr. C. WOODALL, of London.
"Unique Effects from Simple Means; or, a Description of the latest results obtained by Mr. Abraham Malam from his New Process for Manufacturing Cannel Gas, with Models, &c." By Mr. G. D. MALAM, of Halifax.

May 23, 1874. WILLIAM H. BENNETT, *Secretary.*

GEORGE ORME & CO.,
GAS-METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,
ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,
And every Description of Gas Apparatus
GAS, STEAM, AND WATER FITTINGS.

TRADE MARK.
J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.
Estimates and Prices on application to
B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

CLEGG'S TREATISE, Wanted to purchase a late edition of.
Apply, stating edition and price, to A. A. J. H., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

HYDRAULIC MAIN AND RETORT FITTINGS FOR SALE.

THE Longton Gas Company have for SALE the Hydraulic Main, Ascension-Pipes, Front Plates, and all the necessary fittings of a Bench of Brick Retorts. The above will be sold at a cheap price.
For further particulars apply to Mr. J. M. Darwin, Gas-Works, Longton, Staffordshire.

CONTRACT FOR TAR AND LIQUOR.

THE Directors of the Wandsworth and Putney Gas Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their works, at Wandsworth, during the next Twelve months. The Tar and Liquor to be removed by the Contractor by barges whenever required by the Company's Engineer. Monthly cash payments to be made.
The Directors do not bind themselves to accept the highest or any tender
Tenders, marked "Tender for Tar, &c.," to be sent to the Secretary, on or before the 25th of May inst.
North Street, Wandsworth, May 12, 1874.

TO COKE MERCHANTS AND OTHERS.

THE Directors of the Northampton Gas- light Company are prepared to receive TENDERS for the surplus COKE produced at their works for Twelve months, from the 1st of July, 1874, at per ton, weighed on the Company's machine.
The terms of the contract may be seen at the Office of the Company, in Mill Lane, Northampton.
Tenders to be delivered at the Company's Office, on or before the 26th day of May next, addressed to the Manager.
The Directors do not pledge themselves to accept the highest or any tender, and will require satisfactory sureties.
William Dennis, Secretary.
Northampton, April 23, 1874.

GAS TAR.

THE Directors of the Ratcliff Gaslight and Coke Company are prepared to receive TENDERS for the TAR produced at their works, New Crane, Wapping, London, E., for One year, from the 1st day of July, 1874.
All particulars may be obtained on application to the Engineer at the works.
Tenders, marked "Tender for Tar," must be sent to the Secretary on or before the 1st day of June, 1874.
The Directors do not bind themselves to accept the highest or any tender, and may require security for the performance of the contract.
345, Cable Street, E., May, 1874.

GAS LIQUOR.

THE Directors of the Ratcliff Gaslight and Coke Company are prepared to receive TENDERS for the AMMONIACAL LIQUOR produced at their works, New Crane, Wapping, E., for One year, from the 1st day of July, 1874.
All particulars may be obtained on application to the Engineer at the works.
Tenders, marked "Tender for Liquor," must be sent to the Secretary, on or before the 1st day of June, 1874.
The Directors do not bind themselves to accept the highest or any tender, and may require security for the performance of the contract.
345, Cable Street, E., May, 1874.

NOTICE is hereby given that in accordance with the Company's Act, 15 Vict. cap. 82, an EXTRAORDINARY MEETING of the Proprietors of the LONDON GASLIGHT COMPANY will be held at the Offices of the Company, No. 26, Southampton Street, Strand, London, on Wednesday, the 3rd day of June next, at Twelve o'clock precisely, to elect a Governor of the Company in the room of John Robert Hall, Esq., deceased, and in the event of the Deputy-Governor being elected to fill the vacancy, to elect a Deputy-Governor.
Dated this 13th day of May, 1874.
By order of the Board,
A. J. Dove, Secretary.

TO CONTRACTORS.

THE Ironbridge Gas Company invite TENDERS for the supply of and fixing Hydraulic Main, Condenser, Scrubber, and Purifiers at their works, Ironbridge.
Drawings and specifications may be seen upon application at the works.
Tenders to be sent in on or before the 1st of June next.
The Directors do not bind themselves to accept the lowest or any tender. By order,
May 16, 1874. Frederic Chubb, Secretary.

TO IRONFOUNDERS.

THE Oldham Corporation Gas and Water Works Committee are prepared to receive TENDERS for supplying and fixing a set of PURIFIERS.
Plans and specification may be seen at the Gas and Water Offices, Oldham.
Tenders (endorsed) to be sent in to the undersigned on or before Tuesday, May 26.
The lowest or any tender not necessarily accepted.
By order,
Oldham, May 5, 1874. H. Booth, Town-Clerk.

TO MANUFACTURING CHEMISTS AND OTHERS.
TAR AND AMMONIACAL LIQUOR.

THE Keighley Local Board of Health requires TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Gas-Works, for a term of Two years, commencing on the 1st of July next.
Particulars and form of tender may be obtained on application to the undersigned, at the Gas-Works, Low Bridge, Keighley. By order,
John Laycock, Superintendent.
May 14, 1874.

RIPON CITY GAS-WORKS.

MANAGER WANTED.

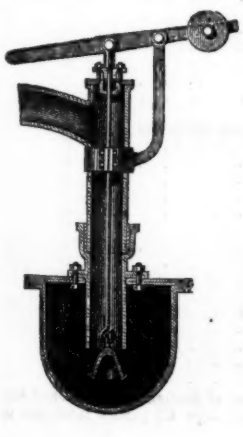
THE Local Board for this city wish to engage a thoroughly competent and experienced MANAGER for their Gas-Works, at a salary of £100 per annum, with a good house and garden rent free, and coals, gas, and water, and the parochial and Local Board's rates will be provided or paid for him.
Applications in the candidate's own writing, marked on the outside "Gas-Works Manager," and stating age and previous employment, with testimonials as to character and fitness for the appointment, are to be sent in on or before Saturday, the 30th day of May instant, to me, at my Offices in Ripon, where also any further information required may be obtained.
R. W. Nicholson,
Town-Clerk, and Clerk to the Local Board.
Ripon, May 13, 1874.

TO MANAGERS AND DIRECTORS OF GAS COMPANIES.

John Wright & Co. feel assured that the introduction of Gas Stoves, either by letting on hire or sale, is greatly to the interest of Gas Companies. The consumption of Gas is thus very greatly increased, and the gas-works made profitable by day as well as by night. Many Companies have adopted this suggestion, and several are now paying us over £1000 per year for our Cooking Stoves.

GAS STOVES,
FOR COOKING.
GAS BATHS; GAS IRONING STOVES,
FOR TAILORS, HATTERS, &c.

Illustrated Pattern Books and Price Lists may be had on application to
JOHN WRIGHT & Co., ESSEX WORKS, BIRMINGHAM.



BOX'S
PATENT ANTI-DIP VALVE

Affords a clear gas way through the dip-pipe while the retort is in action, and produces a perfect seal at pleasure, or whenever the retort is open, offering great security against the drawing of air, and obviating the necessity for using any liquid in the now so-called hydraulic main. It is easy of application to existing apparatus, and is comparatively inexpensive. Is not likely to get out of order, as the tar, which will adhere to the bottom of the dip-pipe and the flange of the cone, both of which are faced, will act as a lubricant, and prevent undue wear and tear. The whole, as will be seen on inspecting the accompanying illustration, is exceedingly simple, and every part accessible. To adapt it to the present dips, all that is necessary is to face the bottom edge of the dip-pipe, and suspend a cone by a rod, which passes through the bonnet, the raising and lowering of the cone being performed through the intervention of a weighted lever.
The Patentee is prepared to supply the Patented Apparatus upon the most moderate terms, and will be happy to reply to any inquiries that may be addressed as under—

W. BOX,
GAS-WORKS, CRAYFORD, KENT.

MUTUAL GAS COMPANY OF BUENOS AYRES.
The Undersigned, as the Agent in Europe of the ABOVE-NAMED Company, WISHES IT TO BE DISTINCTLY UNDERSTOOD that it and the Old Buenos Ayres Company are DIFFERENT Companies.
Franco. Sorrome.
4, Jeffrey's Square, St. Mary Axe, London,
May 18, 1874.

TO COALOWNERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for a supply of COALS, in accordance with a specification to be obtained at this Office.
The principal works of the Company are accessible by railway, in direct communication with all the inland coalfields, as well as by screw colliers from the Northern coalfields.
Tenders to be sent in to me on or before Tuesday, the 26th day of May next. By order,
John Orwell Phillips, Secretary.
Chief Office, Horseferry Road, Westminster, S.W.,
April 25, 1874.

SURPLUS PLANT FOR SALE.

TWO New Purifier Covers, 5 ft. 2 in. square, 15 in. deep—by Porter and Co., Lincoln.
1 new Rack Valve, 8 in.
1 Rack Valve, 6 in. 1 Screw Valve, 6 in. Both three years in use.
1 Cast-Iron Cistern, 12 in. by 12 in. by 15 in., with 3-in. sockets.
1 Cast-Iron Cistern, 18 in. by 18 in. by 18 in., with 2-in. sockets.
2 Cast-Iron Cisterns, 12 in. by 12 in. by 15 in., with 2-in. sockets.
1 Connexion for Scrubber, with Flange, 17 in.
2 Tees, 6 in. by 5 in., flange and socket; 1 Tee, 6 in. by 6 in.; 1 Tee, 7 in. by 5 in.; 1 Tee, 7 in. by 2 in.
5 Bends, 6 in.; 1 Flange Bend, 6 in.; 3 Bends, 5 in.; 2 Bends, 4 in.; 1 Syphon complete, 5 in.; 2 Syphons complete 2 in.; 2 Double Sockets, 6 in.; 2 Double Sockets, 7 in.; 1 Double Socket, 9 in.
8 Wrought Tramway Rails, 12 ft. each.
Apply to Mr. T. H. Bouttell, Manager, Gas-Works, Sleaford.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

THE Directors of this Company are prepared to receive TENDERS for a Supply of best screened Wigan and Newcastle GAS COAL, in quantities as may be required between the 1st day of June, 1874, and the 1st day of June, 1875. The probable amount required will be at least one hundred thousand tons. Parties tendering can do so for the whole quantity or quantities, from ten thousand tons upwards.
The Coal must be fresh, of the best quality, properly cleaned, free from dust, stones, pyrites, and all other impurities.
The tenders must state the name and the locality of the pit, and the particular seam from which the Coal offered is to be supplied.
The contractors will be bound to supply the Coal strictly in accordance with an analysis which must accompany each tender.
The Directors do not bind themselves to accept the lowest or any tender.
Sealed tenders must be lodged in my Office on or before the 22nd inst., endorsed "Tender for Coal," and addressed, E. Fottrell, Esq., Chairman.
By order,
W. F. Cotton, Secretary and Manager.
Gas Office, Dublin, May 14, 1874.

BOLTON CORPORATION—GAS DEPARTMENT.

CONTRACTS FOR CANNEL AND COAL.

THE Gas Committee are desirous of receiving TENDERS for CANNEL and best GAS COAL or NUTS, in quantities of not more than 10,000 tons or less than 3000, for the year commencing the 1st of July next, to be delivered free at the Bullfield or Craddock Lane sidings of the Lancashire and Yorkshire Railway, at Bolton, or, if carted, at the Gas Street or Lum Street works, as may be required.
Sealed tenders, endorsed "Tender for Coal," specifying the description of Cannel or Coal, the pits at which they are to be raised, and the quantities proposed to be supplied, to be sent to the Chairman of the Committee, Thos. W. Holden, Esq., on or before Tuesday, the 2nd of June next, stating also cash terms for monthly payments.
The Committee do not bind themselves to accept the lowest or any tender, but the person or persons whose tender may be accepted, will be required to execute an agreement for the due performance thereof.
By order,
R. G. Hinnell, Town-Clerk.
Gas Offices, Bolton, May 7, 1874.

DARLINGTON CORPORATION—GAS DEPARTMENT.

TO BUILDERS, CONTRACTORS, AND ENGINEERS.

THE Darlington Corporation invite TENDERS for the following EXTENSIONS of their works, each contract to be tendered for separately;—
Contract No. 1.—For the Excavation, Puddling, Brickwork, &c., required to be done in the construction of a Gasholder Tank, 102 feet diameter, and 25 feet deep.
Contract No. 2.—For the various works required to be done in the erection of a Retort-House, capable of containing 120 Retorts.
Contract No. 3.—For the construction and erection of a Wrought-Iron Roof for the previously named Retort-House.
Drawings, specifications, and conditions of Contract may be seen on and after the 18th inst., on application to Mr. WM. B. EMMERSON, Engineer and Manager, Gas-Works, Darlington, to whom all tenders must be sent, properly endorsed, not later than the 22nd of June next.
The Corporation do not bind themselves to accept the lowest or any tender. By order,
H. Dunn, Town-Clerk.

THE

"GAS MANAGERS BENEVOLENT FUND,"

INSTITUTED BY THE

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

OBJECT.

The object of the Benevolent Fund shall be to afford assistance to necessitous Managers **(in any Country)** and their Families, and to the Widows and Families of deceased Managers, whose death may be caused by accident in discharge of duty, or from natural causes, and for relief in other cases requiring attention.

RULES.

Capital and Income.

3.—The fund shall be supported by means of donations and bequests, and annual subscriptions.

4.—All donations and bequests received within the year ending at Midsummer meeting shall be considered as income of that year, unless the donors have specially stipulated how the sums shall be expended otherwise than as income of that year, and, together with all ordinary subscriptions and the interest arising from capital, shall be available for affording assistance, subject to the limitation contained in rule 6.

5.—The accumulations of income, unexpended donations, and bequests (if any), which may arise from year to year, after payment of all grants and other charges and liabilities of the fund, shall be considered capital, and may, in the names of the committee of management of the Benevolent Fund of the West of Scotland Association of Gas Managers, be invested by them in their discretion; and no part of such funds so invested shall be withdrawn from capital, except by a resolution authorizing such withdrawal, passed at a general meeting of the association and contributors specially convened for that purpose, and confirmed at a subsequent special general meeting of the association and contributors, to be held not more than three months, nor less than two weeks, from date of first-named meeting.

6.—The committee of management may, out of donations, bequests, and income, apply in assistance, in the first year, a sum amounting to two-thirds of the income of that year, and in subsequent years a sum not exceeding the average income of preceding years; and it shall be competent for any general meeting to authorize the application of a larger sum.

Privileges of Contributors.

7.—The following contributors to the fund shall be entitled to vote at all general and extraordinary general meetings, viz.:—

Ordinary and extraordinary members, and annual subscribers of not less than £1, whose subscriptions are not in arrear; and donors of not less than £5 in one payment, who shall have one vote for every £5 so given.

8.—Votes may be recorded either personally or by proxy upon all questions submitted to general meetings or extraordinary general meetings in connexion with the management of the fund.

9.—Annual and quarterly subscriptions shall be payable in advance at each quarterly or annual meeting respectively, and no subscriber whose subscription is in arrear shall be entitled to any privileges as to voting or otherwise.

Committee of Management—Their Constitution and Duties.

10.—For conducting the affairs of the fund, there shall be a committee, to be called the "committee of management," consisting of seven members, and composed as follows:—The president, for the time being, of the West of Scotland Association of Gas Managers, the vice-president, the secretary and treasurer, and four members, who shall be elected at the annual general meetings, three to form a quorum.

11.—The president of the West of Scotland Association of Gas Managers shall be chairman of the committee of management, and in his absence the vice-president, whom failing, the members present shall choose a chairman from amongst themselves, and a majority of the quorum may make grants, and do all acts within the powers of the committee of management.

12.—The committee of management shall have full power to make grants and afford assistance to necessitous managers, or others, or to their families, or widows and families of deceased managers, whether contributors to the fund or not, and the fact of having been a contributor shall not in any case constitute a claim to participate in it.

13.—The committee of management may, for the conduct of the affairs of the fund, from time to time, make such regulations, not being inconsistent with these rules, as they may deem to be expedient.

14.—The committee of management shall, if they think fit, appoint one or more of their number for the purpose of visiting, from time to time, those in receipt of assistance, and to report, the expenses in such cases to be chargeable to the fund.

15.—The mode of application for grants and assistance, and the nature of the recommendations to be required in support thereof, the qualifications and merits of the applicants, the amount of the grants in individual cases, and also the purposes to which such grants shall be applied, and the advisability of their renewal, shall, in every case, be left to the determination of the committee of management.

16.—The committee of management shall have power to make investments for behoof of the fund, to sign all cheques for grants, and for all other payments and disbursements; such cheques to be signed by the chairman and one other member of the committee present at the meeting at which such grants shall be made, and to give receipts for all moneys.

17.—The committee of management shall report at quarterly general meetings of the association, the income and expenditure for past quarter; and shall not make any grants or payments by which the donations, bequests, or income of future years shall be anticipated or appropriated.

Meetings.

18.—A general meeting of the association, and the contributors to the fund, shall be held quarterly, at a town, and on a day to be decided on at a previous meeting. At such meetings a report of the committee of management shall be presented, containing the names of all the contributors to the fund, a statement of the number and amounts of all grants made, and assistance afforded during the past quarter; but it shall not be necessary to publish the names of the applicants for, and the recipients of, the assistance afforded by the fund.

19.—The committee of management shall be appointed annually at the Midsummer meeting, and two auditors elected to examine the books and accounts.

20.—The presence of at least nine contributors to the fund shall be necessary for the transaction of business, at either general or extraordinary meetings.

21.—At every meeting, the president of the West of Scotland Association of Gas Managers shall take the chair; and, in his absence, the vice-president, whom failing, a chairman shall be chosen from among the contributors present.

22.—All questions shall be decided by vote, and, should the votes be equal, the chairman shall give a casting vote, provided always that no motion for altering the objects of the fund, or for diverting any portion of the funds, from the purposes herein specified, be adopted, unless at an extraordinary general meeting summoned for the express purpose of discussing such motion, which motion shall not be considered carried unless by a majority of at least three-fourths of the votes at such meeting.

Auditors.

23.—At the annual general meeting two auditors shall be elected to act for the ensuing year, and will meet previous to the meeting to audit the accounts of the fund; and they shall examine the books and accounts, and inquire into the state of the property and finances of the fund, and report thereon at the annual general meeting.

24.—The auditors shall go out of office at the annual general meeting next after their election; but the auditor last appointed shall be eligible for re-election.

25.—No person shall, at the same time, be an auditor and a member of the committee of management.

26.—The auditors fee shall be fixed at the annual general meetings.

Bankers.

27.—The banking account of the fund shall be kept at a bank or banks to be approved of by the committee.

Property.

All the property of the fund shall be vested in the name of the committee of management. Each of the members of the said committee shall be chargeable only for such moneys, funds, and securities as he shall actually receive—notwithstanding his signing any receipt for the sake of conformity—and shall be answerable and account only for his own acts, receipts, neglects, or defaults; and not for those of the other members of the committee.

Mr. William Smith (Gas-Works, Helensburgh), treasurer of the Gas Managers Fund, begs respectfully to acknowledge receipt of the following donations to the fund, being sums formerly received, together with sums sent in response to the circular issued on the 30th of April last:—

Donations and Subscriptions to the Benevolent Fund.

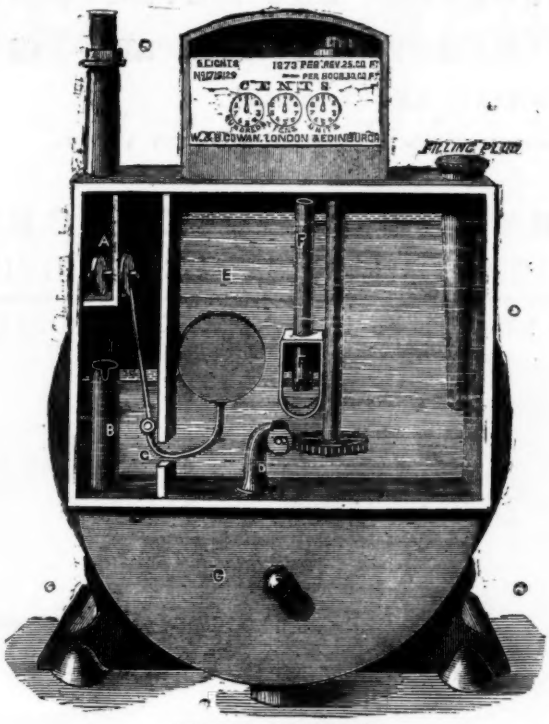
	£	s	d
Stewart, Andrew and James, Glasgow	5	5	0
Laidlaw, R., and Son, Glasgow	5	5	0
Milne, Jas., and Son, Edinburgh	5	5	0
Hannah, Donald, and Wilson	5	5	0
Walker, C. and W., London	5	5	0
Gas-Meter Company, London	5	5	0
Glover, Geo., and Co., Glasgow	3	3	0
M'Kelvie, James, Edinburgh	3	3	0
Glover, Thos., and Co., London	3	3	0
King, W. B., London	3	3	0
Peebles, D. B., Edinburgh	2	2	0
Wright, Alex., and Co., London	2	2	0
Edington, Thos., and Son, Glasgow	2	2	0
Church, Jabez, Westminster	2	2	0
M'Lellan, P. and W., Glasgow	1	1	0
Wood, Jas., Paisley	1	1	0
Ashmore and While, Stockton-on-Tees	1	1	0
Cameron and Roberton, Kirkintilloch	1	1	0
Wood, James, Renfrew	1	0	0
Grieve, J. and C., Tranent	1	0	0
Key, William, Dumbarton	1	0	0
Martin, John, Glasgow	1	0	0
Bellsdyke Coal Company, Airdrie	1	0	0
Ferrier and Strain, Airdrie	1	0	0
Landale, A., Lochgelly	1	0	0
M'Andrew, J., and Co., Glasgow	1	0	0
Malam, Abraham, Dumfries	1	0	0
Walker, H., and Son, Bathgate	1	0	0
Darling, Geo. E., Glasgow	1	0	0
Darling, John, Glasgow	1	0	0
Howie, J. R.	1	0	0
Bower, John	1	0	0
Thomson, Thomas, Dumbarton	1	0	0
Cowan, William, Edinburgh	1	0	0
Donaldson, A., Edinburgh	1	0	0
Warner, W. J., South Shields	1	0	0
Howard, Henry, and Co., Dudley	1	0	0
Young, Hugh, Birmingham	1	0	0
Atkinson, D. H., North Shields	1	0	0
Anderson, George, London	1	0	0
Anderson, Thomas, Bath	1	0	0
Hall, John, Ireland	1	0	0
Thomas, A., Hants	1	0	0
Ohren, Magnus, A.I.C.E., F.C.S., Lower Sydenham	1	0	0
Watson, J. K., Edinburgh	1	0	0
Hall, J., St. Andrew's	1	0	0
Munro, William, Alva	1	0	0
Marshall, William, Yorkshire	1	0	0
Dunn, James, Ireland	1	0	0
M'Leod, John, Renton	1	0	0
Stewart, S., Greenock	1	0	0
Alder and M'Kay, Edinburgh	0	10	0
Kidson, —, Old Kilpatrick	0	10	0
Robertson, J., Milngavie	0	10	0
Lindsay, J. B., and Co., per Mr. Black	0	10	0
Scott, James, Old Kilpatrick	0	5	0
Hamilton, Robert, Glasgow	0	5	0
Londen, J., Kilsyth	0	2	6
Brown, H.	0	2	6

The Committee of Management of the West of Scotland Association of Gas Managers beg to thank the above donors, and hope all parties interested in gas-works will contribute to the scheme.

ESSON'S

PATENT COMPENSATING GAS-METER,

IN TIN CASE, PATENT SIDE VALVE ARRANGEMENT.



DESCRIPTION.

The gas passes from the valve-box A by the overflow-pipe B into the waste water box C, and upwards through the spout D to the measuring drum; E is the compensating fountain, in which also is the float, the lever of which, passing through the hole G, opens and shuts the valve.

When the water level in the meter lowers, the *bottom end* of the air or gas tube F becomes unsealed, thereby admitting air or gas into the upper part of the fountain, which, causing water to pass through the hole G, restores the level in the meter, when this action ceases.

The float and valve are beyond the influence of either inlet or outlet pressure, and the fountain is large enough for a year's supply.

SOLE MANUFACTURERS,

W. & B. COWAN,

WET AND DRY GAS-METER MANUFACTURERS,

(ESTABLISHED 1827,)

King Henry's Walk,
BALLS POND ROAD,
LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD STREET EAST, BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS FOR PURIFIERS AND SCRUBBERS

ALSO MANUFACTURES AND SUPPLIES EVERY DESCRIPTION OF

STEEL AND IRON TOOLS AND GOODS FOR USE IN

GAS AND WATER WORKS,

INCLUDING

Steel Charging Scoops.
Steel Shovels.
Steel Coke Forks and Screens.

Stokers Iron Barrows.
Wrought-Iron Purifier Covers
Cross Bars, Screws, &c., &c.

SLIDE-VALVES.

FOR SALE—14 12-in. and 5 10-in. Slide-VALVES with outside racks. They have been thoroughly re-fitted, and are equal to new. A low price will be accepted to effect a clearance.

Apply to JAMES WATSON, Engineer and Manager, Crystal Palace District Gas Company, LOWER SYDENHAM, S.E.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Aecounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 43, Parliament Street, WESTMINSTER.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

RICHARD THOMAS & CO.,

40, GRACECHURCH STREET,

Manufacturers of

EWELL FIRE-BRICKS, CLAY, AND CEMENT.

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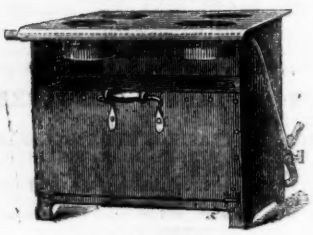

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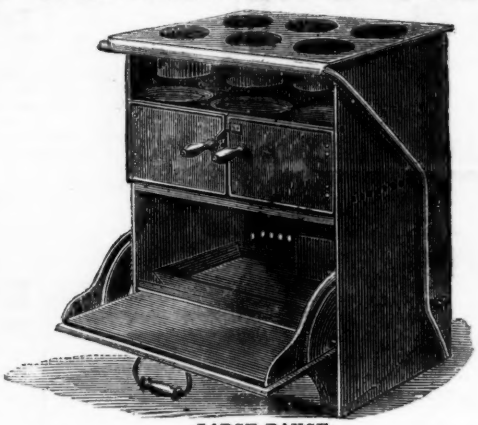

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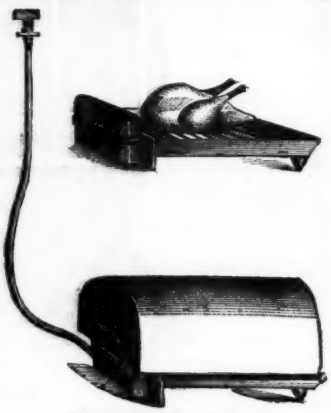

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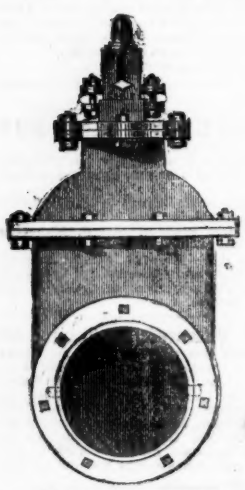

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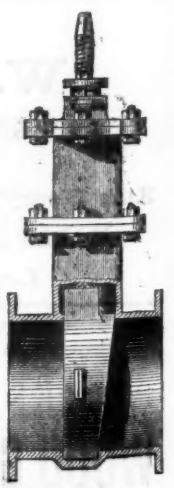
The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



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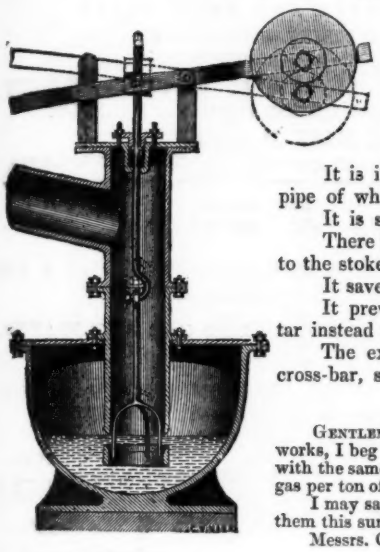

It relieves the retorts from all pressure during the time gas is being made.

The end of the dip-pipe not being immersed in the tar, permits the gas to pass freely, and without pressure, from the retort into the hydraulic main.

The dip-pipe can be effectually sealed without trouble, to resist the back rush of gas, *to any possible pressure*, during the time of charging; but in the event of the Seal being left on, after the retort is closed, no inconvenience is caused, as the piece of pipe used as the Seal only lengthens it to an ordinary dip-pipe.

It is inexpensive, and can be easily and readily applied to any existing hydraulic main and dip-pipe of whatever shape or size, at a trifling cost.

It is simple in its arrangement, and cannot get out of order.

There is no deposit of carbon on the top of the retort, thereby saving considerable time and trouble to the stokers when drawing and charging, also the injury caused by scurfing the retort is avoided.

It saves 10 per cent. of the coal carbonized; also the same proportion of fuel, retorts, labour, &c.

It prevents the thickening of the tar in the hydraulic main, as the heated gas passes *over* the tar instead of being forced *through* it.

The extension piece of pipe is moved by a lever, from which hangs a ⅜-inch rod, hooked on the cross-bar, so that the lid of the retort cannot be struck without first sealing the pipe.

Alton Gas and Coke Company, Alton, Hants, April 25, 1874.

GENTLEMEN,—In reply to your inquiry respecting your Patent Dip for Hydraulic Gas-Mains in use at these works, I beg to say that, upon looking into our carbonizing account for the last 12 weeks, and comparing the result with the same quarters of the past five years, I find that your Dip has given our Company an increase of 1286 feet of gas per ton of coals beyond the make in the other years, notwithstanding the retorts have been in use for three years.

I may say that our Company are so satisfied with the Dips that it is intended to fit up the other retorts with them this summer.

I am, gentlemen, your obedient servant,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street. WM. TRIMMING, Secretary.

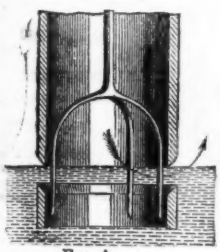

FIG. A.

Figure A shows the extension piece lowered to permit the gas to pass out of the dip-pipe without pressure.

Figure B shows the extension piece raised against the end of the dip-pipe, thereby preventing any back passage of the gas during the time of drawing and charging; and should it be left up while the gas is being made, no inconvenience is caused, *nor danger of bursting the retorts incurred; it being an open pipe and not a solid plug*, the gas will pass under as with the usual dip-pipe.

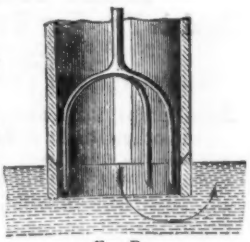

FIG. B.

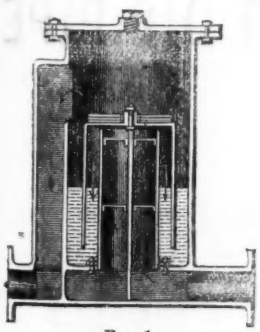

FIG. 1.

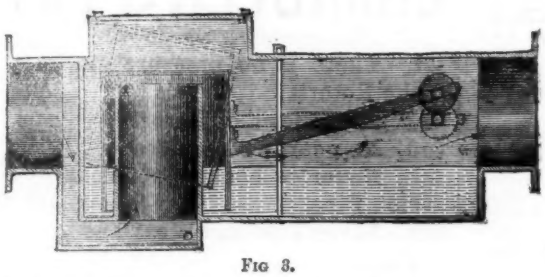

FIG 3.

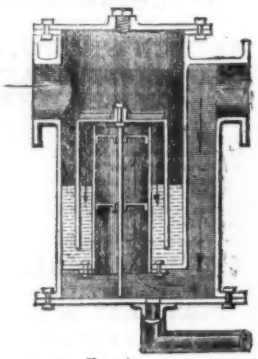

FIG. 2.

BYE-PASS FOR EXHAUSTER (Fig. 1).

This Hydraulic Bye-Pass has been invented for the purpose of supplying to gas companies a cheap, effective, and self-acting valve. It is simple in its construction, cannot get out of order, perfect in its action, can be made to stand any pressure, occupies very little space, and can be adapted to any existing pipes.

Fig. 2 is a Valve similar to Fig. 1, but made to act as a self-acting hydraulic bye-pass for washers, condensers, scrubbers, and meters; the Valve part being *below* the inlet and outlet, so that it may be applied to underground mains. Both Valves can be fitted to existing mains without disturbing them, more than the cutting out of a sufficient length to permit the fitting in of the Valve; after being properly fitted, they will require no further attention.

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For preventing the back flow of gas from the gasholder, and thereby preventing the possibility of accidents (the great damage and danger to life and property resulting therefrom) through the breaking of pipes, unsealing of purifiers, or any other cause. It is easy and prompt in its action, for upon the forward pressure of the gas ceasing, the bonnet *instantly* closes over the stand-pipe, thereby effectually preventing any return of the gas; no extra pressure is put upon any part of the works by its use, and it can be made to tand any required pressure.

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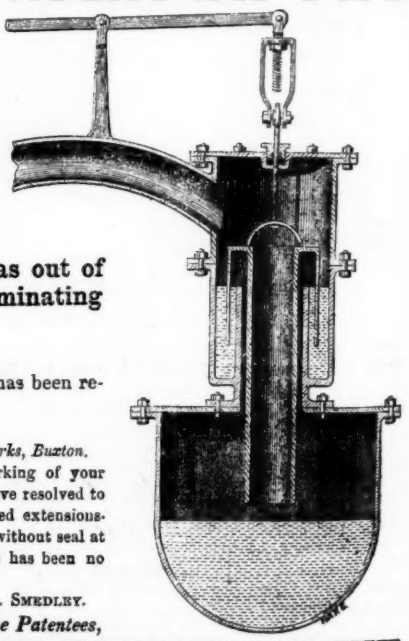

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Jan. 21, 1874. GEO. SMEDLEY.

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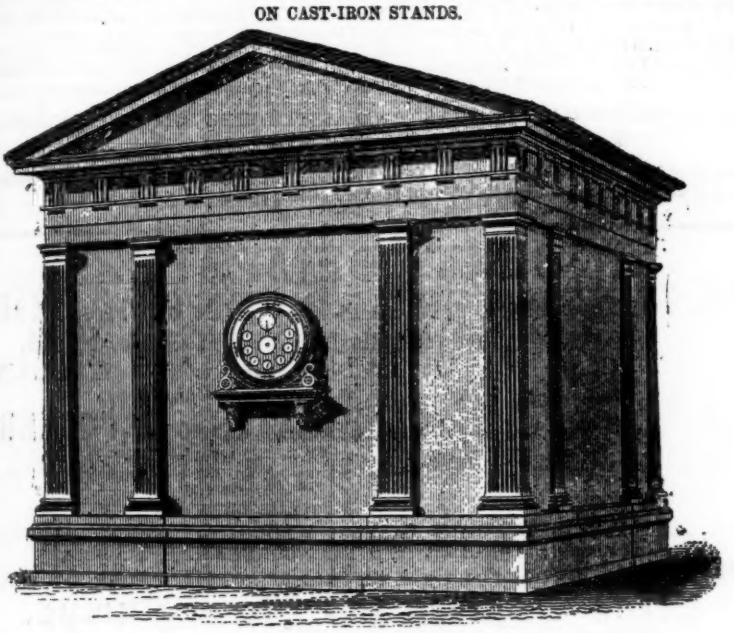

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LONDON, N.W.

These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.
N.B.—Specimens sent free on application.

B. CARPENTER,
THE ORIGINAL MANUFACTURER OF
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.

WORKS:
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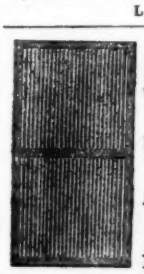
LONDON, N.



DEMPSTER'S
RENOWNED
WOOD SIEVES,
WITH TAPER BARS,
MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.

THE PATENT
CATOPTRIC LAMP
Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
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HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,
SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description,
EXHAUSTERS.
LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

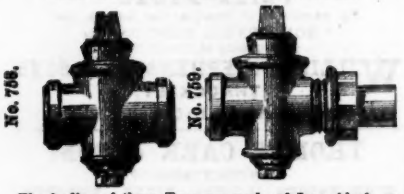
GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS.
DELIVERY F.O.B. ON CLYDE.
Lists on application.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.

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WROUGHT-IRON WELDED TUBE AND FITTINGS,
BRASS, COPPER, LEAD, TIN, AND COMPOSITION TUBING,
Stocks, Taps, and Dies, and Every Description of Gas-Fitters' Tools; Gas Slide and Sluice Valves;
CARTER'S SAFETY GAS-VALVES;
GAS-STOVES, REGULATORS, BURNERS, &c.
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OMOA GAS COAL.

THE OMOA AND CLELAND IRON AND COAL COMPANY, LIMITED,
ARE NOW IN A POSITION TO
SUPPLY FROM THEIR PITS AT OMOA
GAS COAL
OF A VERY SUPERIOR QUALITY.

This Coal, according to the report of the analyst, yields 11,110 cubic feet of gas per ton, and has an illuminating power of 33·97 candles per 5 cubic feet per hour.

Copies of the analysis and full particulars as to price, &c., may be had on application to the SECRETARY of the COMPANY, 52, West George Street, GLASGOW.

ESTABLISHED 1844.

WHITLEY PARTNERS, LIMITED,
RAILWAY WORKS, LEEDS,
ENGINEERS, FOUNDERS, AND LICENSEES;
MANUFACTURERS OF IMPROVED STEAM-ENGINES, BOILERS, PUMPS, &c.;
MAKERS, BY SPECIAL MACHINERY, OF PATENTED MECHANICAL INVENTIONS,
Comprising numerous Labour-saving Appliances and Economizers of Fuel and Motive Power;
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MERCHANTS AND SHIPPERS OF MACHINERY, METALS, AND HARDWARE;
AWARDED
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"For Improved Construction, Excellence of Material, and Superior Workmanship;"
TWO GRAND GOLD MEDALS AT THE MOSCOW INTERNATIONAL EXHIBITION, 1872;
ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."

ILLUSTRATED CATALOGUES AND ESTIMATES ON APPLICATION.
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Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.

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GAS ENGINEER AND CONTRACTOR,
ROSE MOUNT IRON-WORKS,
ELLAND, near HALIFAX,
MANUFACTURES AND EFFECTS
GAS APPARATUS & MACHINERY
OF EVERY DESCRIPTION.
GAS EXHAUSTERS,
WITH STEAM-ENGINES COMBINED.
DRY, CENTRE, AND BYE-PASS VALVES; WROUGHT-IRON AND CAST-IRON SCRUBBERS; ANNULAR AND PIPE CONDENSERS, ALL SIZES.
PURIFIERS from 4 to 40 FEET SQUARE.
Steam-Engines and Steam-Pumps.
RETORT SETTERS & FITTERS SENT TO ALL PARTS.
ALL WORK AND MATERIALS GUARANTEED OF THE BEST DESCRIPTION.

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ELLIS LEVER & CO.,
GAS COAL MERCHANTS,
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ALL CLASSES OF
ENGLISH, SCOTCH, & WELSH CANNEL COALS.

MESSRS. NEWTON, CHAMBERS, & CO.,
THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD,
STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

LEE and JERDEIN,
COAL OWNERS & MERCHANTS.
Chief Office:
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SOLE VENDORS FOR
LONDON & THE SOUTHERN COUNTIES
OF
WIGAN COAL AND CANNEL,
From the Mines of the
INCE HALL COAL & CANNEL COMPANY, Limited,
AND
Messrs. W. H. BRANCKER & Co.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

EVERY DESCRIPTION
OF
GAS COAL AND CANNEL
SUPPLIED BY
E. FOSTER & CO.,
COAL and CANNEL
MERCHANTS,
21, JOHN STREET, ADELPHI,
LONDON, W.C.
Prices Quoted on application.

THE
HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL
Yields 12,550 cubic feet of 33-candle gas per ton.
Prices and full Analyses on application.

THE MIDLAND COAL COMPANY
Are prepared to enter into CONTRACTS with
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FOR SUPPLIES OF
GAS COAL & CANNEL.
Prices, Analysis, and other information on application at the
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G. J. EVESON,
GAS COAL MERCHANT,
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Delivery per Rail to any Part.

ALBERT GAS COAL.

THE DERBYSHIRE
SILKSTONE COAL COMPANY,
LIMITED,
CAN OFFER A
GAS COAL
Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO
Mr. EDMUND TAYLOR, Secretary,
ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

DUKINFIELD CANNEL COAL.

THE DUNKIRK COAL COMPANY.
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DRY GAS-METERS,

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(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

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MANUFACTURERS OF

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of the highest excellence.

STATION-METERS AND GOVERNORS.

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of the most perfect description for all purposes relating to Gas.

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"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E.
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CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,
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HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES
TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

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